

# Machine and Tool BLUE BOOK

A DIGEST OF THE METAL WORKING INDUSTRY

**FEBRUARY 1947**

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**A HITCHCOCK PUBLICATION**



**MARVEL** SAW  
**SAWS**



# hobart

simplified control

encourages faster, better arc welding



It's simple to easy to obtain improved quality, weld and increase welding speed when Hobart Welders are at work. By turning just two dials, the operator selects the exact welding heat in all possible combinations of voltage and amperage. Then by removing the Remote Control Unit, it is able to adjust welding heat at the work—eliminating the possibility of step in returning to the machine. These are only two of the many time- and money-saving features found in Hobart Welders that make them the biggest profit producers on the market. Check and mail the coupon today for complete information.

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use this handy coupon

**Free!** Handy  
"Welders' Vest  
Pocket Guide."

Gentlemen: Please send me free book and ne  
Hobart catalog showing the entire welder lin  
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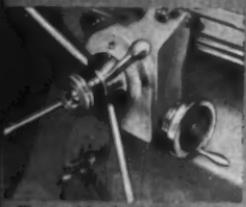
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For TOOL ROOM  
and  
**FINE PRODUCTION**  
ON PARTS REQUIRING  
**INTERNAL, EXTERNAL OR  
SHOULDER GRINDING**

*Now You CAN ACHIEVE  
A GREATER VARIETY OF  
PRECISION OPERATIONS*



Fine table feed with micrometer stop for shoulder and face grinding.

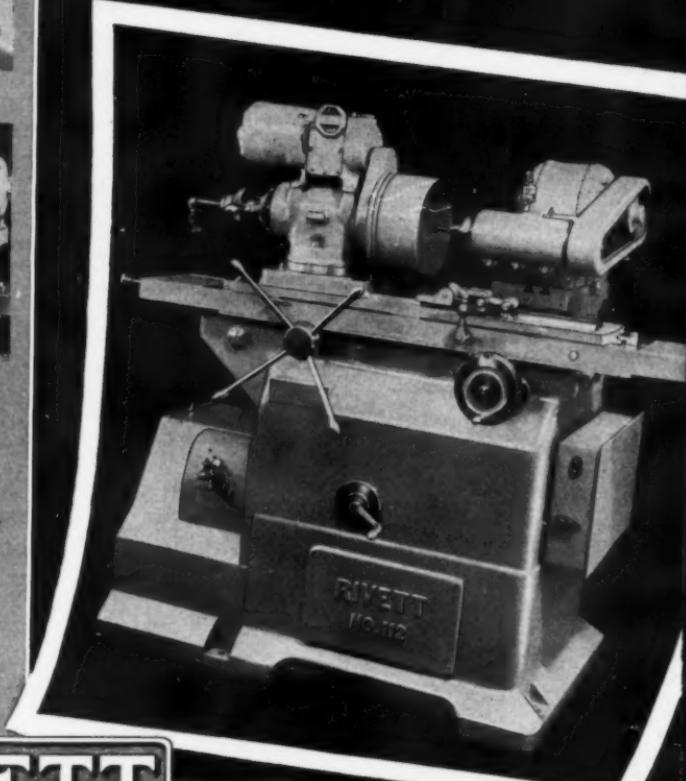


Spindle, tail stock and dead center drive for external center grinding.

**SPECIFICATIONS**

Grinding cap., hole dia.	1/4" to 8"
Grinding cap., outside dia.	up to 10"
Automatic table travel	1/4" to 8"
Table speeds	18 selective
Swing over table	14"
Workhead swivel	90°
Table swivel	90°
Cross slide swivel	90°
Collet capacity	1"
Grinding spindle speeds	
Internal	5000 to 25000 r.p.m.
External	3300 r.p.m.
Net weight with motor	3700 lbs.

The Rivett No. 112 Universal Grinder can be quickly set up for straight, taper, bevel or straight and bevel grinding on one or many pieces. Interchangeable brackets are selectively mounted on the cross slide for internal and external operations. Power driven table stroke can be controlled for exact positioning on internal and external shoulder grinding. Extreme simplicity of design assures easy and efficient operation by even a lay machinist. Write for Bulletin No. 112.



**RIVETT**

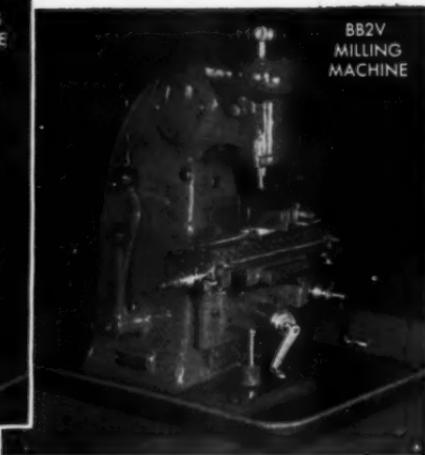
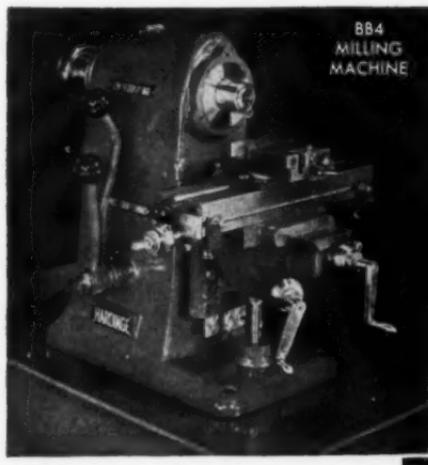
**RIVETT LATHE & GRINDER INC.**

BRIGHTON, BOSTON, MASS.

**HARDINGE**  
ELMIRA, N.Y.

## HIGH SPEED PRECISION MILLING MACHINES

### Provide Greater Economy for Small Parts



Vertical or Horizontal—any way you look at it—closer proportion in the size of the machine tool to the size of the work means greater efficiency.

HARDINGE Precision Milling Machines are small, compact and designed to do a volume job on small parts. For a low, original investment, the HARDINGE Milling Machines can release large equipment that is really too cumbersome for small work . . . and parts manufacturing costs can be reduced.

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Table size, both machines, 12" x 3  $\frac{3}{8}$ ". BB4 has  $\frac{3}{4}$ " collet capacity, eight speeds to 3000 r.p.m. BB2V has  $\frac{1}{2}$ " collet capacity, eight speeds to 5000 r.p.m.

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"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

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## Quality TOOLS



### ARMSTRONG TOOL HOLDERS

Permanent, multi-purpose tools, for every operation on Lathes, Planers, Slotters and Shapers.

### ARMSTRONG HIGH SPEED

Ready-to-grind Bits... Ground Cutters. **ARMALOY** Cast Alloy CUTTER-BITS. **ARMIDE** Carbide-Tipped CUTTERS

6 cutter shapes, 12 sizes—2 grades.

### ARMSTRONG Turret Lathe and

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Drill Holders, Cutter Holders, Finishing and Knurling Tools for standard operations.



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### ARMSTRONG Drop Forged "C" CLAMPS

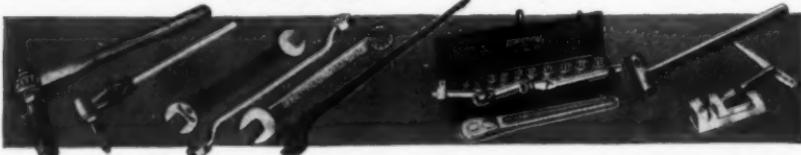
Heavy Duty, Medium Service, Deep Throat, and Tool Makers' types in all sizes. Also Machinists' Clamps.

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A complete line of Drop Forged Strap Clamps, Planer and Bracing Jacks and T-slot Bolts.

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Plain or shoulder pattern. Blank or Threaded. 14 sizes, Drop Forged and heat treated.



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#### Socket Wrenches

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# Machine and Tool BLUE BOOK

FEBRUARY, 1947

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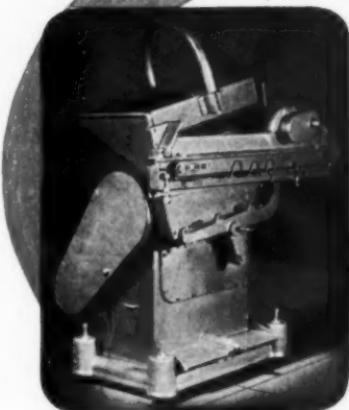
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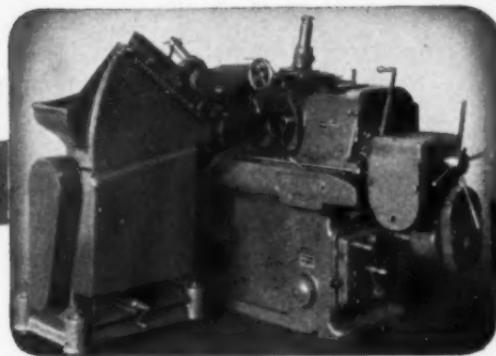
# WITH THESE ATTACHMENTS YOU CAN ASSIGN MORE JOBS TO YOUR CINCINNATI CENTERLESS

• What kind of work do you want to assign to your CINCINNATI Centerless Grinder? Short, single diameter parts? Headed parts? Contour shapes? Steel bars? Small quantities or millions? Regardless of the shape, size, or quantity, the chances are that you can obtain a standard or semistandard CINCINNATI attachment designed especially for that type of work. And in special cases, Cincinnati Application Engineers (who have more than 20 years of centerless grinding experience at their disposal) will be glad to study your problem and recommend the most economical setup. Feel free to write to us, giving complete details. In centerless grinding, it's CINCINNATI FILMATIC for the right size of machine and the right equipment for the job.



Type E Feedmatic Hopper for long runs of thrufeed jobs. Eliminates manual feeding operations. One man can operate several machines equipped with hoppers.





Type B Feedmatic Hopper, designed for long runs of infeed work. Shown on the right of the machine is the Automatic Infeed Attachment.



Roller Headed Work Rest, for supporting one end of the work while the other end is being ground. Made in several sizes to handle work from 25" to 55" lengths.



Type C Long Bar Attachment for grinding bars  $\frac{1}{2}$ " to 2" in diameter and lengths up to 18 feet.



Type A Long Bar Attachment for grinding bars  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " in diameter and lengths up to  $2\frac{1}{2}$  feet.



CINCINNATI FILMATIC No. 2 Centerless Grinding Machine. Complete information is contained in catalog G-456-4.



Type B Long Bar Attachment for grinding bars  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " in diameter and lengths up to 8 feet.

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CINCINNATI 9, OHIO, U.S.A.

CENTER TYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPING MACHINES



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*Anti-Scoring*  
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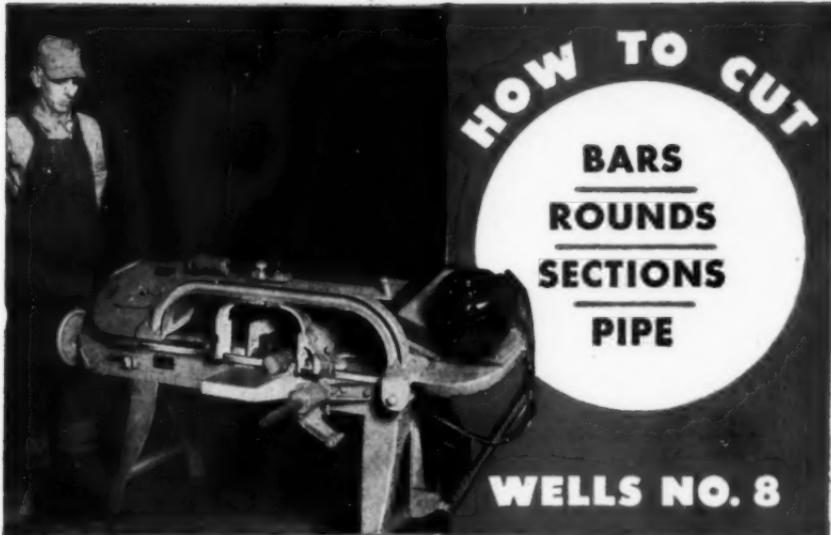
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ADDRESS.....



HOW TO CUT

**BARS**  
—  
**ROUNDS**  
—  
**SECTIONS**  
—  
**PIPE**

**WELLS NO. 8**

**specifications**

**CAPACITY:**

Rectangular . . . 8" x 16"  
(Special Guides) . . 5" x 24"

**ROUNDS:** . . . 8" diameter

**MOTOR:** . . 1/2 H.P., A.C. or D.C.

**SPEEDS:** Selective

60, 90, 130 feet per minute

**WEIGHT:** Approximately 665 lbs.

**METAL CUTTING BAND SAW**

If you have a variety of metal cutting jobs —bars, rounds, sections, pipe, tubes—it will pay you to investigate the advantages offered by portable, practical Wells saws. Simple in design and rugged in construction, the Wells No. 8 requires no highly skilled operator or special handling. Powerful, quick-acting vise reduces set-up time to a minimum. Gravity feed and automatic shut-off make it practical for one man to operate two or more Wells saws simultaneously. For production work, your Wells can be equipped with the new Wells Wet Cutting System for faster cutting and longer blade life. Ask for the complete story. Literature and quotations on request.

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BAND SAWs**

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707 COOLIDGE AVENUE, THREE RIVERS, MICHIGAN



A STANDARD MACHINE WITH  
THESE 3 Advantages

- ★ LOWER INITIAL COST
- ★ REDUCED MAINTENANCE
- ★ EASILY ADAPTED TO  
SPECIAL PURPOSE OPERATIONS

THE *Robbins*  
No. 3  
*Drillmatic*

The Robbins No. 3 DRILLMATIC is designed and built as a STANDARD MACHINE specifically for special purpose drilling, reaming, tapping and boring operations at lower cost. Drill heads with any number of spindles are easily mounted on the tooling saddle and by use of auxiliary units around a special base, multiple operations may be performed vertically, horizontally or any angle in between. When operations are changed, the No. 3 Drillmatic can be economically converted to the new job.

Old-type soft ways are replaced by large diameter guide bars in the saddle. These bars slide in guide bushings on the oversize machine column. Both the bars and bushings are hardened and ground alloy steel . . . automatically lubricated. The saddle is actuated by a sturdy hydraulic ram directly over the work, reducing friction on the guide bars and further contributing to the life-time wearing qualities of both the bars and bushings.

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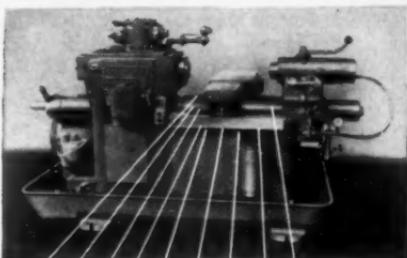
Send for illustrated catalog which details the many "plus" features of construction and operation. Study them over; then consult with Robbins engineers on the applications in your plant. Robbins is qualified to design and build the tooling for your entire job . . . tooling that will do the job faster, better, more economically. *Robbins Engineering Company, 318 Midland Avenue, Detroit 3, Michigan.*

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ROBBINS No. 3 DRILLMATIC • SPECIAL MACHINERY

## Why this front carriage is more versatile

Here's one of the many reasons why this machine can perform a number of different machining cycles and handle a remarkably wide range of work for an automatic lathe.



### THE GISHOLT HYDRAULIC AUTOMATIC LATHE



The front carriage is clamped to, and receives its longitudinal motion from, a large diameter hardened steel bar along which the carriage may be clamped at any position.

The outer support for the carriage is a hardened steel beam of rectangular section, pivoted at one end and with an up-and-down motion for the other end provided by the piston-cylinder unit on the front of the machine. Raising or lowering this beam imparts a transverse movement to the carriage.

Many combinations of transverse and longitudinal motions can be made at both feed and traverse rates to meet practically every requirement. An angular in-feed attachment may be added for advancing

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With a rear slide which can be placed on the bed table to feed in or out, straight or angularly, you have the combination that means faster, lower cost production on a wide variety of parts. Write for literature.

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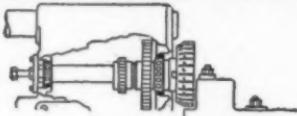
*Look Ahead... Keep Ahead  
with Gisholt*



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**CONVENTIONAL DESIGN**



Spindles on most milling machines are supported by only 2 bearings. There is no support at the center of the shaft, where deflection is most likely to take place.

**KEARNEY & TRECKER DESIGN  
SO BASIC — SO SOUND**



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**KEARNEY & TRECKER  
MILWAUKEE**

# 800% more rigidity!

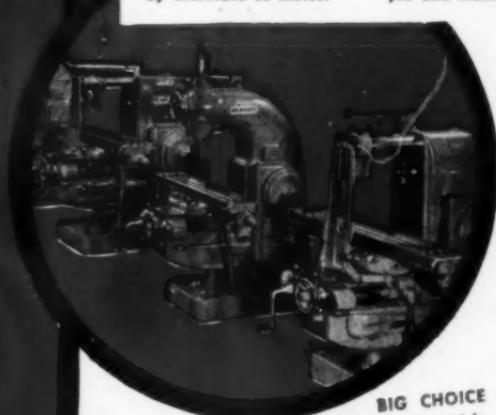
*Secret of modern milling machine accuracy and longer tool life lies in three bearing spindle design . . . one of the many great features of Kearney & Trecker Milwaukee Milling Machines . . .*



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Those double overarms provide maximum rigidity to tool set-ups — assure proper alignment and provide easy access to arbor and cutters. That means greater precision, less tool wear and real operator convenience.



Catalog E-53 gives you complete data on our entire line—Write for it! Please indicate your business connection.

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with a*

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**Entire frame of machine of structural steel, electrically arc welded throughout**

**Basewheels—4" diameter, iron wheels**

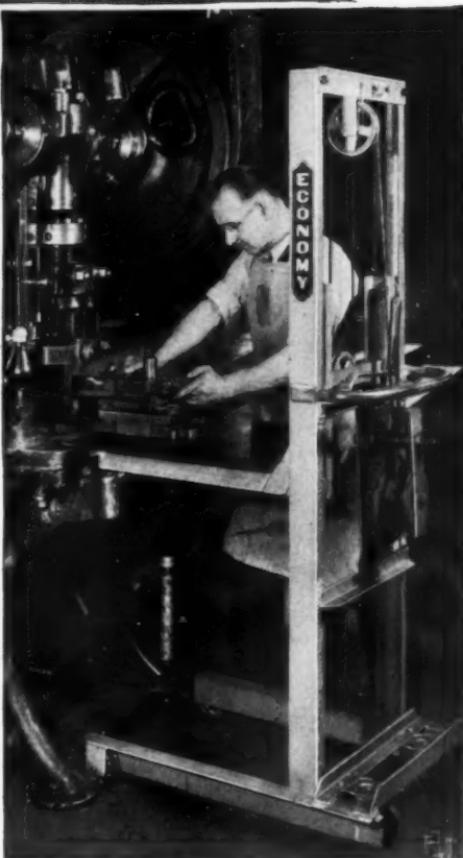
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**Two swivel casters and two stationary wheels with push bar furnished**

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**Weight—250 lbs. (approx.)**

*Heavier capacities up to 5,000 lbs.  
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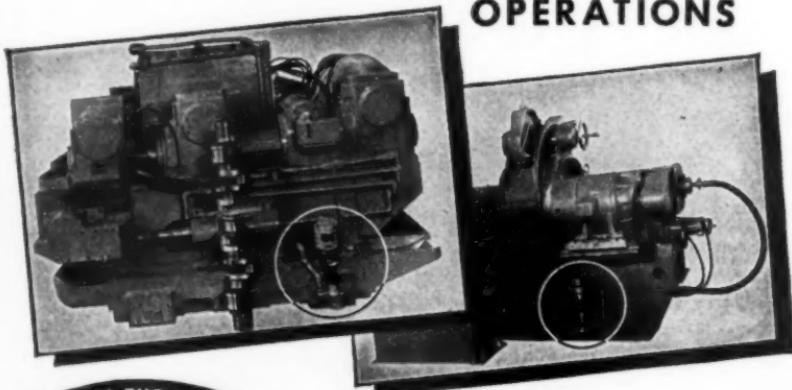
## The CHARLES L. JARVIS Co.

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# SPEED

## CUTTING OPERATIONS



FOLLOW THE LEADERS  
USE  
"GUSHER"  
COOLANT PUMPS

WITH  
**RUTHMAN**  
**GUSHER**  
**COOLANT PUMPS**



MODEL  
TL 7320

\*Photos courtesy The Crank-shaft Machine Co.; The Gardner Machine Co.

To speed production on metal cutting operations, these leading manufacturers of machine tools turn to Ruthman Gusher Coolant Pumps.

Illustrated above left is a "MELLING" TYPE CRANK-SHAFT CONTOUR TURNING LATHE, made by the Crankshaft Machine Company. It is equipped with a  $\frac{1}{4}$  H.P. MODEL SLO-7230 RUTHMAN GUSHER COOLANT PUMP. At the right is a SPECIAL "GARDNER" DOUBLE SPINDLE GRINDER with a  $\frac{1}{4}$  H.P. MODEL 11022 SHORT GUSHER COOLANT PUMP.

Satisfied customers are your best guarantee of the service a "GUSHER" will give you. Always specify them on your machines.

WRITE FOR CATALOG 10G.

THE RUTHMAN MACHINERY CO.

1823 READING ROAD

CINCINNATI, OHIO



16" No. 5-10,000 B.V.  
2-Spindle Bench Drill



14" No. 3000 F.V. 1-Spindle  
Sensitive Floor Drill



4-Spindle 21" Box Column  
Sliding Head Floor Drill



6-Spindle 21" Box Column  
Sliding Head Floor Drill



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Sliding Head Floor Drill



21" Box Column  
Sliding Head Floor Drill



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BEAR THE CANEDY-OTTO NAME

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**3. Tool Steel for the Non-Metallurgist**—A complete discussion of the several types of tool steels, their qualities, and suggestions for their heat treatment. A thirty-two-page book that is easy to understand.

**4. Rex High Speed Tool Bits**—An eight-page folder giving the characteristics and applications of the Rex line of high speed tool bits.

### 5. Crucible Warehouse Stock Book—

Lists the full range of steels available from Crucible's nationwide warehouse network. Contains working instructions, tables, and other material helpful in specifying, heat treating, and use of these steels.

**6. Data Sheets**—Individual four-page data sheets, punched to fit standard 3-ring binder, are available on a full range of grades under each of the following types of steels:

#### HIGH SPEED STEELS

#### HOT WORK TOOL STEELS

#### Die Casting Die Steels

#### Plastic Molding Steels

#### AIR HARDENING

#### TOOL STEELS

#### OIL HARDENING

#### TOOL STEELS

#### WATER HARDENING

#### TOOL STEELS

#### ALLOY STEELS

#### MACHINERY STEELS

These data sheets contain complete information on type of steel, uses, critical temperature, forging, annealing, hardening, tempering, and hardness, together with TTT curves. You should have in your working library the data sheets on all the types of steels you use.

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## A Few Facts You Should Know

### About

# "Acorn" Dies

**SIMPLE CONSTRUCTION • EASY TO OPERATE • FACTORY TESTED**

To understand the operation of the "Acorn" Die, one should see it in relation to the "Acorn" Die Holder as pictured at the right in sectional view. The feature which makes the "Acorn" Die so convenient and accurate is the manner in which the four prongs or threaded lands are compressed when the holder cap is screwed down onto the holder. As all bearing surfaces on the holder and die are ground to insure correct alignment and accuracy, even pressure is brought to bear on each of the prongs simultaneously so that they all adjust equally and concentrically. This is done quickly and automatically by tightening the cap and turning up the lock nut. No other adjustments are necessary.

A positive adjustment to size can be obtained by using the threaded plug which comes with every "Acorn" Die. This plug has actually been threaded by the die in which it is shipped and has been carefully checked for accuracy. Thus, if it is used as a setting plug, accuracy of the set up will be assured. For close to shoulder work, quick change over of jobs, accurate threads, specify "Acorn" Dies to your local Greenfield Distributor.

**HOLDERS ADAPT "Acorn" Dies FOR ANY MACHINE**

#### REGULAR



Regular "Acorn" Die Holder with longitudinal float which allows the die to follow its own lead independent of any lag in the machine. This holder may be used on practically all automatic screw machines and any other machines which provide for automatically reversing the die or rod at the instant when the desired length of thread has been cut.

#### RELEASING



Releasing "Acorn" Die Holder, while suitable for all machines, is especially recommended for hand operated machines. The improved clutch mechanism allows the holder to be released without shock.

#### ADAPTER



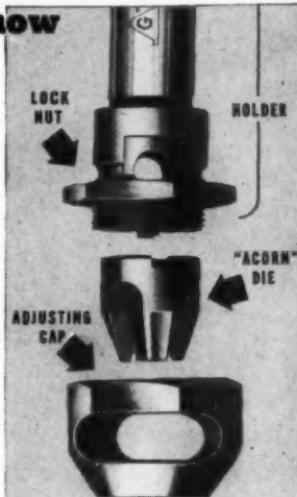
The "Acorn" Die Adapter permits the use of "Acorn" Dies with existing round die holders. It consists of three parts, a Cap to hold and adjust the die, a Lock-Nut to secure the adjustment and a Body. The shank fits round or spring die holders of corresponding size.



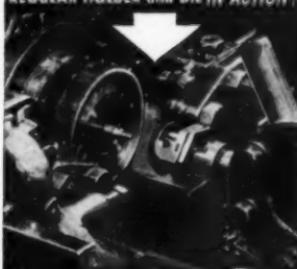
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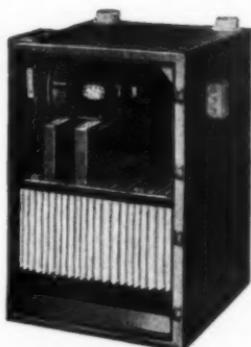


In factories, as well as homes, the dust problem is serious. Stop dust at its source with:

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Collect dust right at the machine with TORIT Dust Collectors. Self-contained units, they eliminate extensive piping, and cut operating costs. Cleaned air is recirculated into the room.

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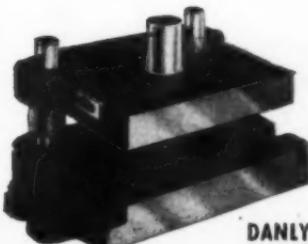
**DANLY KWIK-KLAMP TOGGLE CLAMPS** combine strong construction and simplicity of operation—used wherever quick, positive clamping action is required.



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*in the  
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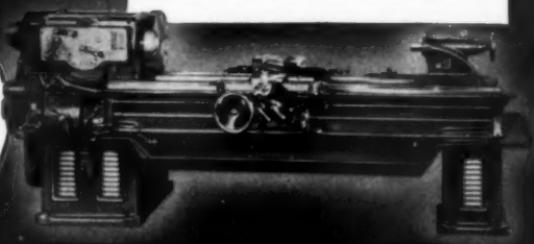


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- All of these machines feature the continuous tooth herringbone geared, sixteen speed headstock *exclusively*. This form of gear tooth provides more tooth contact, resulting in greater strength, smoother action with end thrust eliminated through the opposed helix angle. One of the many Sidney features insuring a long, accurate machine life.

This exclusive feature, with its smooth flow of power, also accounts for the successful use of carbide cutting tools on so many jobs.

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Line of Hand  
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by leading  
Jobbers.

# New Britain

GREATER STRENGTH • BETTER FIT **HAND TOOLS**

*Special*

# CARBIDE TOOL GRINDER

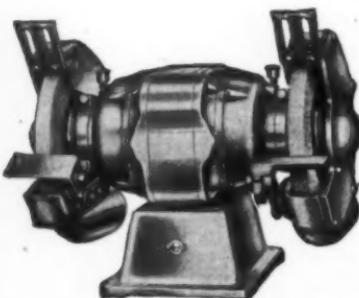


## FOR QUICKLY AND ACCURATELY SHARPENING CARBIDE TOOLS

BALDOR GRINDER, series 500, (shown above) is the newest development in grinders designed and fully equipped for sharpening Carbide Tools quickly and accurately; has sturdy  $\frac{1}{2}$  H.P., reversible, ball-bearing motor. 6" Silicon Carbide wheels; adjustable tool-rest tables, water pot. Complete as illustrated and GUARANTEED 2 YEARS against burn-out.

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AT LEFT: BALDOR Bench Grinder, No. 101.  $1\frac{1}{2}$  H.P., ball-bearing motor; 1725 rpm; 10" Aloxite wheels; adjustable tool rest.

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**BALDOR**  
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Improved  
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to work



Moto-Tool Kit No. 2 Now includes professional accessories on  
Model 2 Moto-Tool in wood case \$21.50. (Items purchased separately would cost about \$30.00; you save \$8.50).

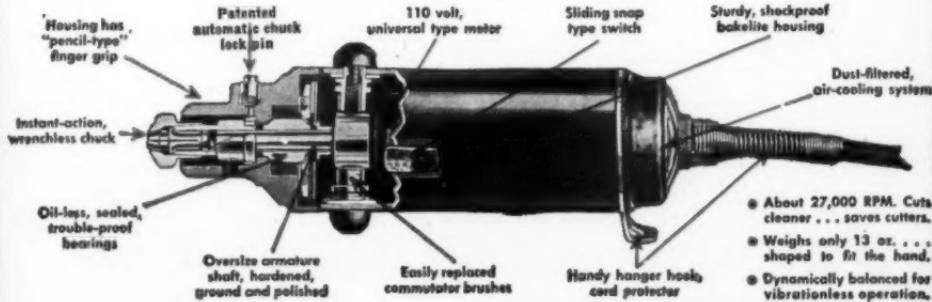
Moto-Tool No. 2 with one extra

3 Moto-Tool Stand (left) made of heavy cast iron, holds Moto-Tool at any angle or angle. \$4.50  
Moto-Tool Shaping Table \$2.50. (Shown with stand, right). Aids accuracy in routing and grinding.



Dremel's improved, "pocket size machine shop" . . . the famous Moto-Tool . . . can save you hours, by speeding up work now being done by hand. It cuts, grinds, routes, carves, engraves, cleans and polishes. Invaluable as a sharpening tool alone . . . for taps, drills, gouges, chisels, tools and cutters (without tearing down "set-ups"). Moto-Tool is a "war veteran" . . . thousands of them were used at far flung maintenance bases by every branch of the armed forces. For years such plants as General Electric, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft, Northrup, Douglas, etc. . . . have bought Moto-Tools for use in tool rooms and on production lines.

## LOOK FOR THESE MOTO-TOOL FEATURES



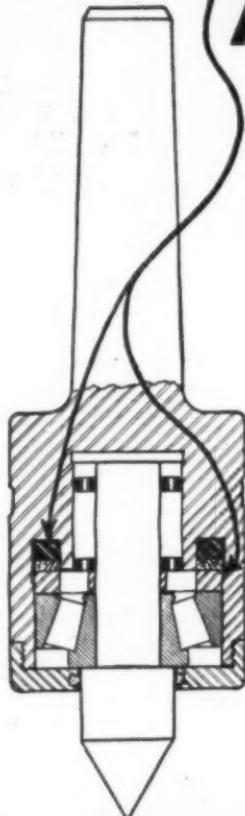
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**PRECISION CENTERS**

The arrows point to the resilient pad "Shock Absorber" on which the front annular roller bearing seats. This absorbs the shocks which are bound to occur in all machining operations — reduces tool breakage and spoiled work. Automatically compensates for expansion of work due to heating, thus relieving excess pressure on Timken bearing.

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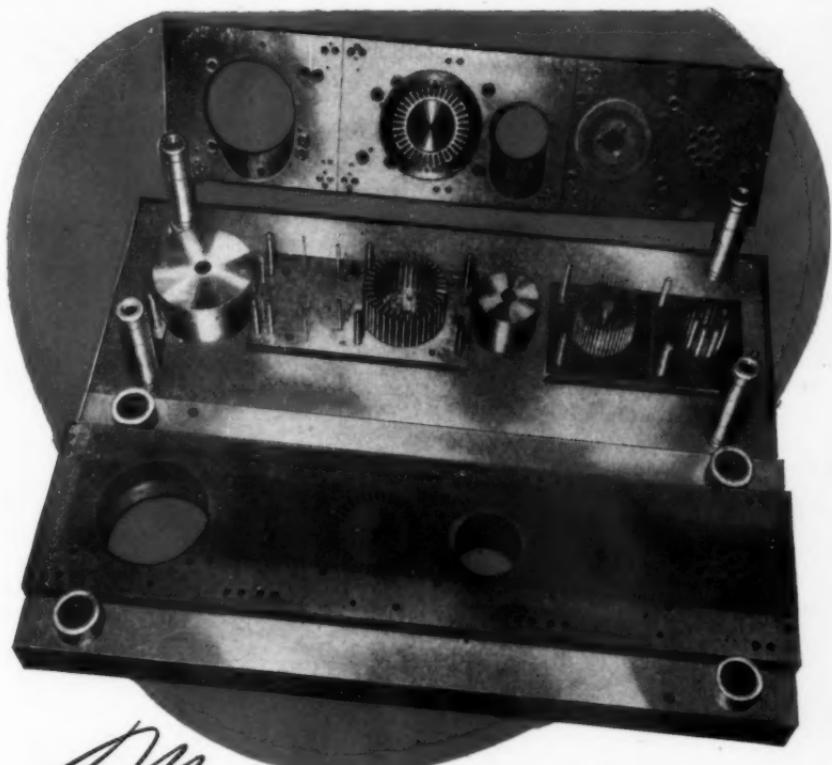
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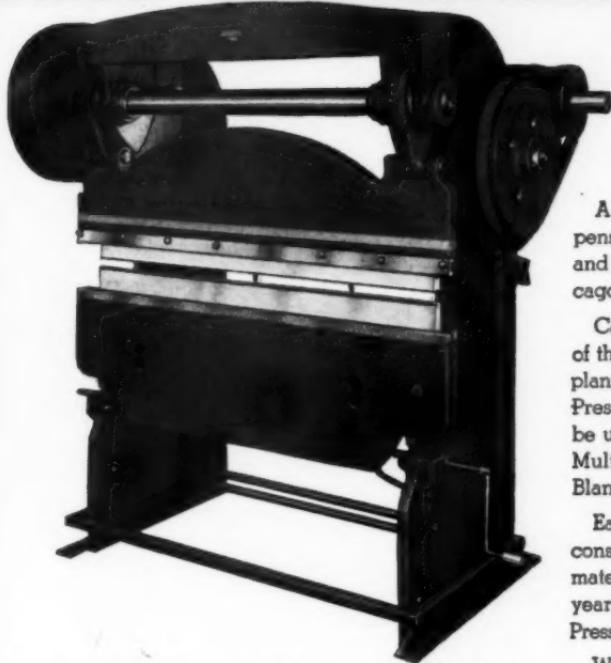


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Can handle 40 to 50 percent of the work done in the average plant, thereby releasing the larger Presses for heavier work. Can be used for Forming Embossing-Multiple Punching, Notching, Blanking, etc.

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REPLACE SOLID TYPE  
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Ingersoll *inserted* blade cutters are replacing solid high speed steel and solid brazed tip designs due to economy of replacement blades. When worn out it is not necessary to purchase complete new cutters, as only the *inserted* blades are perishable. The cost of a new solid cutter is many times the small cost of a set of Ingersoll *inserted* blades.

When buying cutters always check replacement blade costs. The housing is a capital investment which lasts for many years. The blades are perishable and a continuous expense. Due to simple, though rigid, blade lock, Ingersoll *inserted* blades are less expensive. — High Speed Steel, Cast Alloy, and Carbide tipped.



END MILLING CUTTERS



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This booklet shows through illustrations and charts the wide range of usefulness of the Ingersoll Cutter Grinder.

INGERSOLL CUTTER GRINDER



This 15" x 23" grinding chart gives basic grinds for standard milling cutters. Suitable for mounting in a conspicuous place in a tool room.



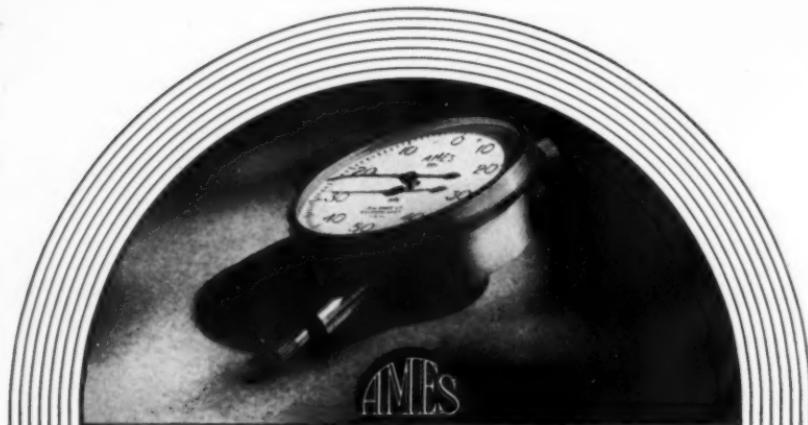
INTERLOCKING SLOTTING CUTTERS



This booklet is intended to help you properly select standard cutters for your work. Where these do not apply we are prepared to design and build special tools.

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Month after month of continuous extra heavy duty in many of the world's largest plants has made the Marveco Live Center the proven tool . . . and the only one which has an automatic take-up to compensate for bearing wear.

Guaranteed to outperform and outlast any other Live Center.

Send for your Catalog "The Marvels of Marveco"

*Send us your center problems*

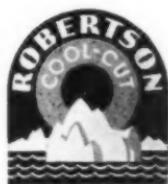
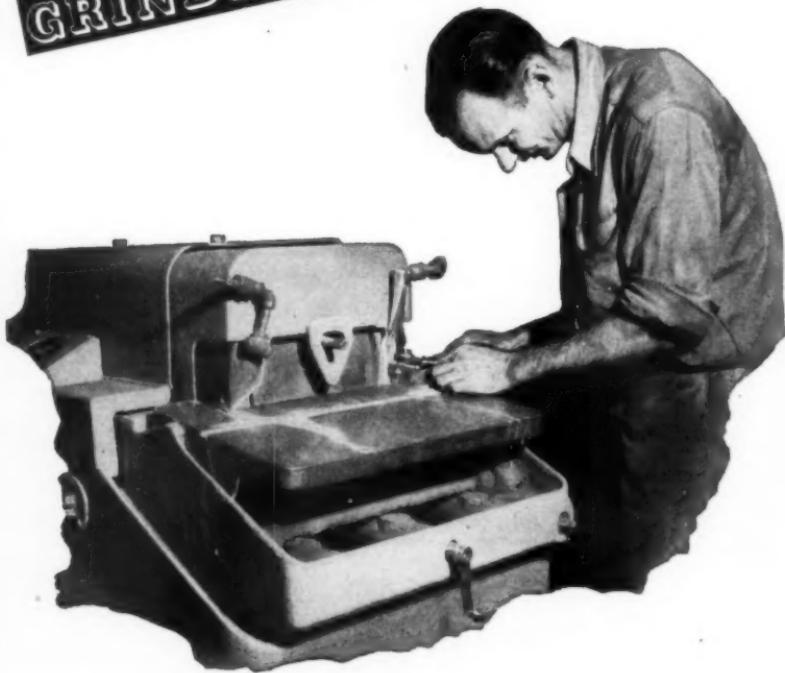
**MARVEL TOOL**

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DETROIT 12 • MICHIGAN

# GRINDING TIPS



## ... HOW TO GRIND CARBIDE-TIPPED TOOLS

ARE CHIPPED AND CRACKED carbide-tipped tools a common complaint in your shop? Are your grinding wheels wearing out too soon? Here are two "tips" on grinding which Robertson engineers have found very helpful in conserving both tools and wheels.

The grinding of carbide tools by applying heavy pressure against the wheel is extremely harmful. Actually, grinding is accomplished much faster, and with much more satisfactory results, by passing the tool slowly across the face of the grinding wheel with a light, uniform pressure. This results in fewer wheel dressings, making for longer wheel life, and eliminates chipping and cracking of tips.

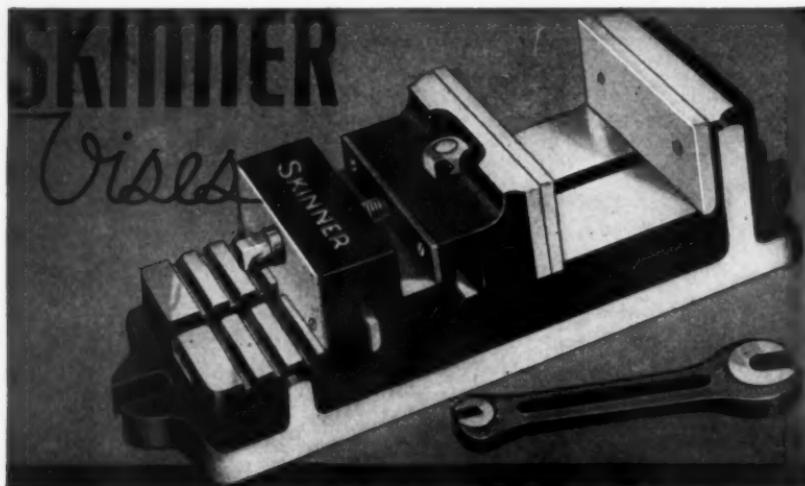
Grinding both the shank and the carbide tip at the same time glazes the grinding wheel and generates excess heat, causing the wheel to lose its free-cutting action. This will also chip or crack the tip and tend to loosen it in its setting. These faults are overcome by undercutting the shank about  $2^{\circ}$  more than the carbide tip.

Robertson Cool-Cut wheels for grinding carbide-tipped tools range from 6" x 1" up to and including 14" x 4" x 11", all plate-mounted.

Highly satisfactory results have been obtained using our GC60-I-2V for roughing operations and our C120-HV for finishing operations. For the best results from any grinding operation, make sure your grinding wheels are Robertson Cool-Cuts . . . the wheels that are precision-built for the toughest jobs.

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**MANUFACTURING COMPANY, TRENTON 5, N. J.**

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This sturdy quick-acting accurately machined vise is designed for all around work on Drill Presses. Clamp the work for all drilling in one plane; drill; then turn this vise on edge for a second operation in a plane at right angles — without reclamping. Available in  $2\frac{1}{2}$ ,  $3\frac{1}{2}$ ,  $4\frac{1}{2}$ ,  $5\frac{1}{2}$  and  $7\frac{1}{2}$  inch sizes. Write for catalog giving prices and dimensions.

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*The*  
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NEW BRITAIN, CONN., U. S. A.

Skinner Milling Machine  
Vise equipped with swivel  
base.



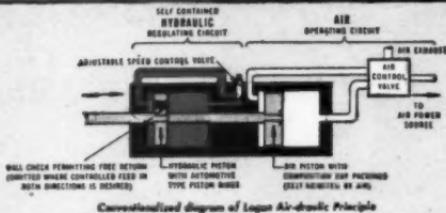
Quick-acting, sure-grip-  
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NOW YOU CAN GET

The Fast-Action,  
Low Pressure,  
Economical Operation of... **AIR**  
The Smooth, Uniform,  
Controlled Regulation of... **OIL**  
*Combined*

IN THE NEW, IMPROVED "LOGAN"

# AIR-DRAULIC CYLINDERS



Conventionalized diagram of Logan Air-draulic Principle

For mechanical operations where accurate control of movements is essential and air operation is preferred, AIR-DRAULIC Cylinders give far more uniform action than any ordinary air cylinder. Separate air and hydraulic pistons are assembled as a unit on a common piston rod (see diagram). Operation is by means of compressed air, controlled by an air valve. As the piston rod is moved, oil flows between the two chambers in the hydraulic cylinder. An adjustable speed control valve in this self-contained circuit regulates the flow of oil, and hence the speed of the rod movement.

Logan AIR-DRAULIC Cylinders can be furnished for controlled feed with rapid return in either direction, or controlled feed in both directions. Skip feed movements can also be provided by means of cam valves in the hydraulic circuit.



Powered by AIR... feed controlled in self-contained HYDRAULIC circuit (no power unit required)

- Air cylinder is brass-lined steel tubing; piston has self-adjusting molded cup packings.
- Hydraulic cylinder has centrifugal-cast iron barrel, with bore honed to a mirror finish. Piston has 3 automotive-type piston rings.
- Leakproof, vibration-proof *Collet-Grip* hydraulic tube fittings.
- Large air inlets assure rapid response.
- Standard bores from 3" to 8"; any stroke to 5 feet. For air pressures to 150 p.s.i.

## New FREE CATALOG

Learn how the new, improved Logan AIR-DRAULIC Cylinders can give you hydraulic power at a minimum cost. Send for your copy of Catalog 471.

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ENCLAS • CYLINDERS • VALVES • PRESSES • BURE • FLOW COOLANT PUMPS

# L-W SWIVEL BASE MILLING MACHINE VISES

**MASTER \$38.00**

Jaws: 6½" wide, 2" deep.  
Opens 4" with jaws, 5¼" without.  
Wt. complete with crank, boxed, 85 lb.

★

**JUNIOR \$28.35**

Jaws: 4½" wide, 1¾" deep.  
Opens 3" with jaws, 3½" without.  
Wt. complete with crank, boxed, 35 lb.

★

**STEEL JAWS**  
Suited to drill press and shaper work.

**GRADUATED BASE**  
Can be used plain or swivel.

**LARGE ACME STEEL SCREW**  
Contributes sturdiness and durability.

**FOUR BOLT AND KEY SLOTS**  
are provided for rigidly attaching to  
machine table so that work holding  
surfaces are at true right angles  
or parallel to table.

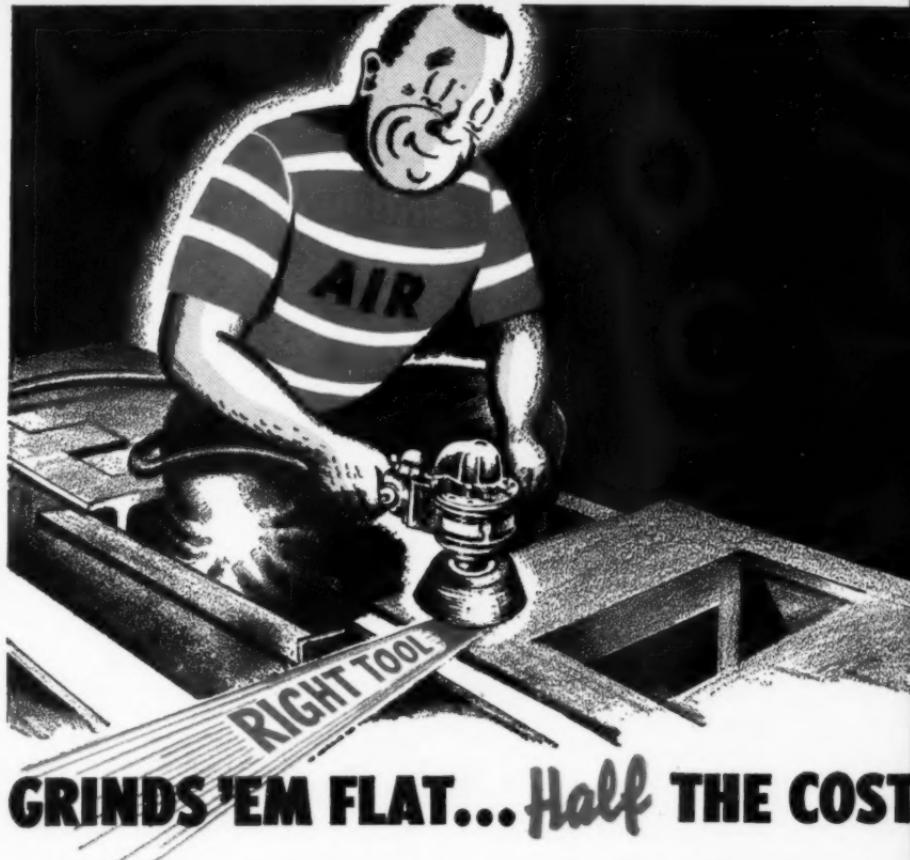


Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



**L-W CHUCK COMPANY**

23 SO. ST. CLAIR ST.  
TOLEDO 4, OHIO



## GRINDS 'EM FLAT... *Half* THE COST

**T**HIS weldery was using straight type 6" air grinders to grind off excess weld metal and spatter . . . to make bottoms of machine bases flat and smooth. The Rotor Application Engineer suggested changeover to vertical grinders with 6" flared cup wheels. The New B-30 Rotor Air Grinders were installed. Results:

*Doubles output per man* because flared cup wheel contacts larger area and makes it easier to grind high spots flush with other metal.

*Improves appearance of work* because flat wheel surface grinds smooth . . . does not dig grooves into metal.

Call in the Rotor Engineer to suggest the *right tool* for your jobs. Bul. 30 free on request.

Yours for lower costs,

**AIR O'TOOL**

AIR

THE **ROTOR TOOL** CO.

HIGH  
CYCLE

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PRACTICAL TOOL PROBLEMS



## ARE YOU REORDERING OBSOLETE BROACHES?

A broach performing satisfactorily right now can often be redesigned to increase production, improve finish and eliminate operations

The above *redesigned* broach did just this. Now it produces the 1" hole in an aluminum casting to a 10 micro-inch mirror finish. Eliminates reaming, grinding and honing.

Let us check your prints for up-to-the-minute design *before reordering*.

**LET MICHIGAN  
FURNISH YOUR  
PRODUCTION PARTS**

*Completely  
Machined!*

With the largest production machine shop of its kind, Michigan will machine your production parts, complete, *assuming "undivided responsibility"*, for the engineering, tooling and production.



*Parts like these are machined by Michigan.*

Get Michigan's quote and check costs. Michigan may be able to save you money and headaches.

*Do you have our 9 folders on broaching?*

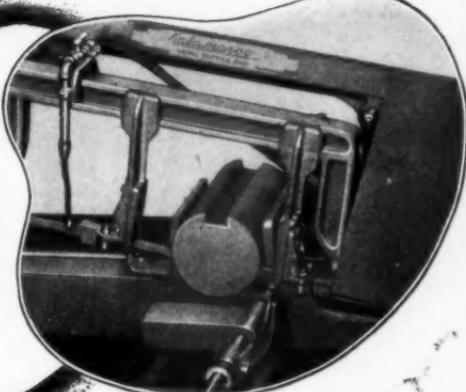
**MICHIGAN**  
BROACH CO.

**MICHIGAN**  
BROACH CO.

**10370 NORTHLAWN AVENUE**

**DETROIT 4, MICH.**

CUTTING  
ACTION  
ALWAYS  
IN VIEW



You do not have to sit on the floor or throw your neck out of joint to check the cutting operation on the Kalamazoo Band Saw. Look right down into the cut — make adjustments while machine is operating.

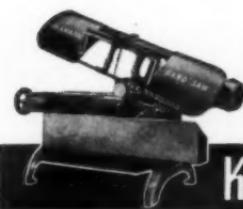
Visibility is an important factor in accurate, fast, cut-off work — and the Kalamazoo provides a clear view of the job from the start to the finish of the cut.

Ask your dealer or write direct for complete information.

#### MACHINE TOOL DIVISION

Kalamazoo Tank & Silo Co., Kalamazoo 16, Michigan

In Canada—Bridge Machinery Co.—Montreal



**Kalamazoo Metal Cutting Band Saw**

# INDEX

## VERTICAL MILLS

### FOR THE TOOL ROOM OR PRODUCTION LINE

For use with end mills  $\frac{1}{8}$ " to 1" in steel. Equipped with verniers, as standard equipment in addition to micrometer dials on table actuating screws for locating. Further accuracy available with rods and indicators which can be furnished as extra equipment.

If you want speed and precision on milling, drilling and boring send for a catalog on Index Mills.



### 12" TOOL ROOM ROTARY TABLE



A quality tool for precision work in the tool room or production line, incorporating such features as ball bearings—hardened and ground worm—quick acting throw-out for free hand turning—single movement table lock that does not cramp table out of alignment—compound trough. 12" size only.

### INDEX MILLS

Index Mills participated in all important war production programs from camera and guns to atomic bombs. Ask any owner how they like their Index Mill.

Write to Factory Sales and Distributing Agents for complete information.

**BLANK & BUXTON  
MACHINERY CO.**

3100 E. MICHIGAN AVE.  
JACKSON, MICHIGAN

# PERFORMANCE FIRST

YOU TOO CAN DO THE JOB BETTER



ON A **GEMCO** **SHAPER**

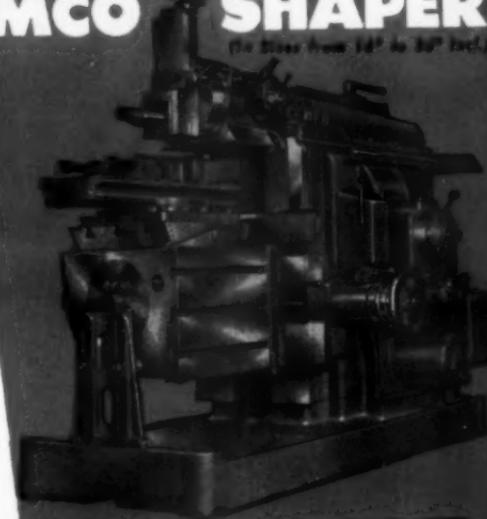
(10°, 15°, 20°, 25°, 30°, 35°, 40°)

## \* THESE 7 USERS TELL YOU WHY...

1. "GEMCO downfeed of head, fingertip touch of traverse, and the Lubrigard Safety features, are perfect."
2. "GEMCO SHAPERS cut the machining time on our motor yokes 25%."
3. "Whenever we have a particularly difficult job to do, we always do it on a GEMCO."
4. "GEMCO is a mighty good Shaper, easy to handle, rugged, and accurate even on a maximum stroke."
5. "Our GEMCO maintenance cost, for the past 18 months has been only ONE R.H. screw, cost 3¢!"
6. "Our GEMCO Shaper has proved its worth many times over."
7. "We've had our GEMCO Shaper a year, and our tool makers are still enthusiastic about it."

\* EXCERPTS FROM  
TYPICAL LETTERS  
IN OUR FILES.

MFRS. OF



# GEMCO

## Multi-Purpose SHAPERS

Shown above is the Universal Type GEMCO Shaper. It is ideal for tool and die work, or for angular set-ups. Embodying the exclusive Lubrigard Safety Feature, its life for precision operation is unlimited.

**GENERAL ENGINEERING  
AND MFG. CO.**

ST. LOUIS 14, MISSOURI

PRECISION MACHINERY SINCE 1917

GEMCO

Another New  
**DE-STA-CO**  
HEAVY DUTY  
*Plunger Clamp*

**DE-STA-CO MODEL NO. 620**  
*Reverse Action-Plunger Type*

This new, versatile, plunger type clamp is designed to increase production and assure positive parallel clamping action during welding, drilling, assembly or milling operations. Excellent for quick-action and the locking of work in jigs and fixtures.

Plunger rod is tapped to receive  $\frac{3}{8}$ "-16 bolt for adjusting. Reverse action permits operating ease in restricted or congested areas and where working height is limited.

Available from our distributors in the U.S.A. and Canada.

Write today for catalog No. 47

**DETROIT STAMPING CO.**  
Established Over 30 Years  
347 Midland Ave Detroit 3, Mich.

# A MUCH HIGHER STANDARD OF METAL CUTTING PERFORMANCE

Watch your production drive ahead when you install SAWMORE METAL CUTTING MACHINES. Extremely fast—highly accurate—rugged—modern in design—SAWMORE sets higher precision metal cutting standards with an economy of operation that slashes labor costs and builds profits.

These are the highlight features of SAWMORE machines: \* \* Four Cutting Speeds—65, 83, 120, 149 strokes per minute. \* \* Self-aligning blades give absolute cutting accuracy. \* \* Stock is fed automatically to full capacity of machine. \* \* Machines swivel on base up to 45° permitting angular cutting without moving stock. \* \* Gears are in constant mesh, reducing amount of backlash to minimum. \* \* Positive compensating feed cuts more metal in less time. \* \* Transmission housed in oil tight case.

Write today  
for new FREE  
catalogue.

IMMEDIATE  
DELIVERY

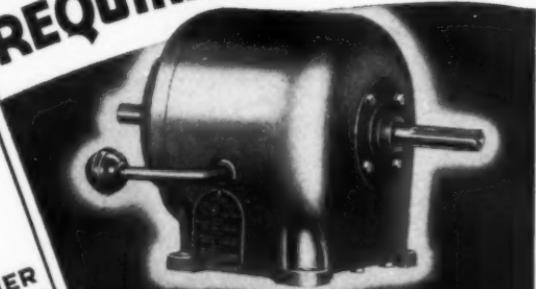


**MAQUOKETA  
COMPANY**  
MAPLE STREET  
MAQUOKETA, IOWA

# ATTENTION! Manufacturers and Users

## LIMA NOW OFFERS A Multi-Speed GEAR REDUCTION DRIVE FOR MACHINERY REQUIRING UP TO 1 hp.

ADAPTABLE To...  
MACHINE TOOLS  
CONVEYORS  
BLOWERS  
MIXERS  
ROLLS  
DRYERS  
AND MANY OTHER  
MACHINES REQUIRING  
SELECTIVE...  
... SPEEDS



TYPE RD ILLUSTRATED DESIGNED  
FOR SEPARATE MOTOR DRIVE  
Other Integral LIMA Gearshift Drives  
Single phase  $\frac{1}{2}$  and  $\frac{3}{4}$  hp.  
Polyphase  $\frac{1}{2}$  hp to 20 hp.

THE LIMA ELECTRIC MOTOR CO.

246 FINDLAY ROAD

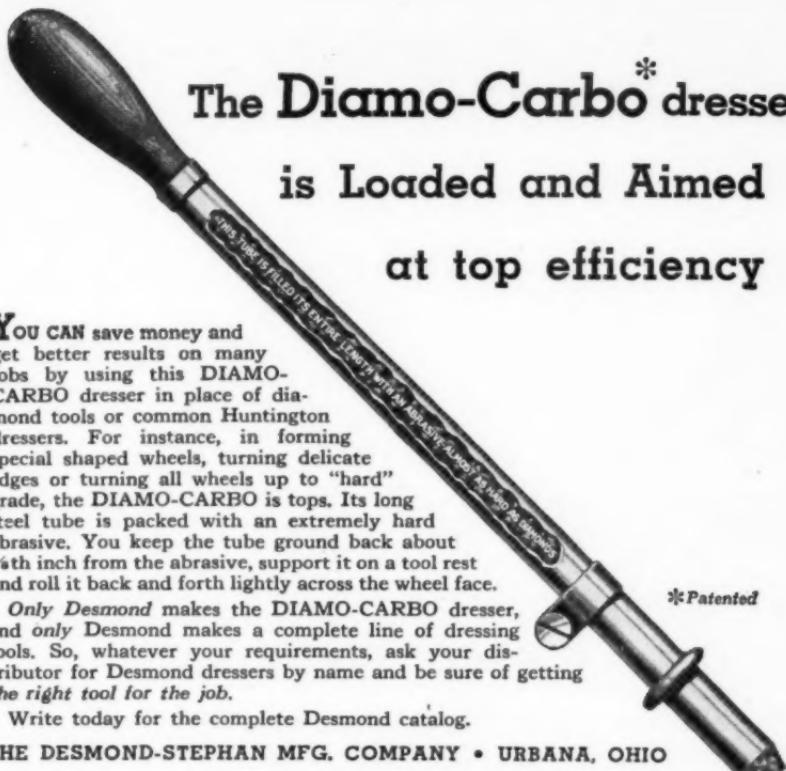
LIMA, OHIO

REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES

LIMA PEDESTAL GRINDERS - LIMA ELECTRIC MOTORS





# The Diamo-Carbo\* dresser is Loaded and Aimed at top efficiency

**Y**OU CAN save money and get better results on many jobs by using this DIAMO-CARBO dresser in place of diamond tools or common Huntington dressers. For instance, in forming special shaped wheels, turning delicate edges or turning all wheels up to "hard" grade, the DIAMO-CARBO is tops. Its long steel tube is packed with an extremely hard abrasive. You keep the tube ground back about  $\frac{1}{8}$ th inch from the abrasive, support it on a tool rest and roll it back and forth lightly across the wheel face.

*Only* Desmond makes the DIAMO-CARBO dresser, and *only* Desmond makes a complete line of dressing tools. So, whatever your requirements, ask your distributor for Desmond dressers by name and be sure of getting *the right tool for the job*.

Write today for the complete Desmond catalog.

**THE DESMOND-STEPHAN MFG. COMPANY • URBANA, OHIO**

\*Patented

# Desmond

the only complete line of grinding wheel  
**DRESSERS & CUTTERS**



BALL BEARING  
DRESSERS



REVOLVING  
CUTTER TYPE DRESSERS



DIAMOND HAND TOOLS  
AND NIBS



WHEEL TYPE  
DRESSERS



SIMPLEX  
STEEL-SLIDE VISES



## DOCKSON #145 KIT

A COMPLETE WELDING AND CUTTING OUTFIT FOR  
LIGHT AND MEDIUM RANGE OPERATIONS

This 145 easily handles any light or medium welding or cutting operation up to 3-inch steel plate.

- Finest design and construction.
- Scientifically balanced, sturdy equipment for effortless operation.
- Economically priced. Today's best buy in a quality outfit.

FACE SHIELDS • GOGGLES • HELMETS FOR EVERY NEED

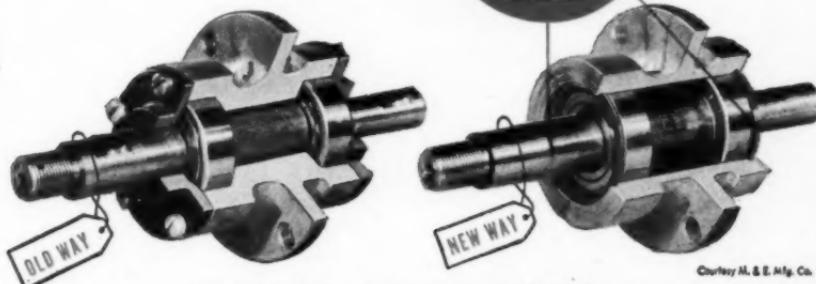
Write for your copy of our *Welding or Safety Equipment catalog*.

**Dockson CORPORATION**  
3839 WABASH AVE. • DETROIT 8, MICH.

# TRUARC trims 13 minutes machining to 6

## cuts new exhaust fan bearing unit

- 25% in weight
- 66% in assembly time



Courtesy M. & E. Mfg. Co.

Use of Waldes Truarc Retaining Rings permits housing redesign—eliminates heavy cast bearing caps and screws requiring drilling and tapping; lowers labor and material cost.

"**TRUARC PAYS DIVIDENDS IN SAVINGS!**" declares M. & E. Manufacturing Company, of Indianapolis, makers of exhaust fans for industry. "Improvements in design made possible by Waldes Truarc Retaining Rings provide a quieter, freer-running assembly, assure longer life to the entire unit, eliminate the hazards of uneven unnecessary pressure on the bearing and minimize future service requirements. In our experience Truarc has definitely proved itself the better method for doing an important job."

Truarc does a better job on axles and shafts for retaining and positioning wheels, pulleys, cams and gears. In widely varied applications, designers find its never-failing grip, its patented design that assures constant circularity, make Truarc the better way to hold machine parts together. Production and maintenance men in many industries see how Truarc rings cut costs sharply, maintain accurate, unvarying relationship of parts. Send us your drawings; Waldes Truarc engineers will be glad to show how Truarc can help you.



WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

● Send for new Truarc booklet,  
"New Development in Retaining Rings"

Waldes Kohinoor, Inc., 47-10 Astoria Place  
Long Island City 1, N. Y.  
Please send booklet, "New Development in Retaining  
Rings" to:  
Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Business Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



HERE'S A NEW, ADJUSTABLE  
**CHUCKING REAMER...**

THAT ASSURES  
**FAST, ACCURATE  
PRODUCTION**

After months of careful research and actual production tests, Lempco is now ready to offer you the best adjustable chucking reamer ever made. It is made in two styles. Model C has a straight shank. Model CT has a tapered shank.

The new Lempco Reamer can be used in place of any standard reamer without changing set up. They will produce a smooth finish even when used to finish holes with keyways, slots, oil grooves or other interruptions.

Lempco Chucking Reamers are available in sizes from  $\frac{3}{4}$ " to  $1\frac{1}{2}$ ". They have an expansion range of .025" to .031" according to size. These reamers are not deformed when expanded. They have straight line expansion, thus assuring a constant cutting surface over the entire length of the blade at all times. Blades can be resharpened 8 to 10 times, then economically replaced.

Decide right now to buy Lempco Adjustable Chucking Reamers. They will enable you to get better and more accurate production.

*Write today for full details and prices of the new Lempco Chucking Reamer.*

8729 DUNHAM RD., BEDFORD, OHIO

# Save 3 ways with...

## KRW ARBOR PRESSES



SAVE with KRW  
HAND-OPERATED PRESSES

1

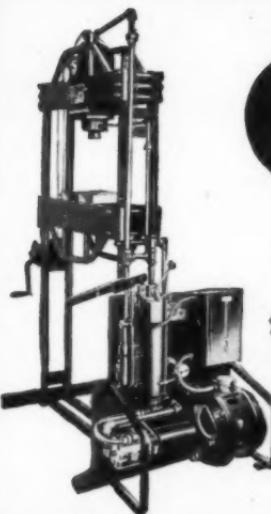
You name the job, and we'll name the KRW Press best fitted to do it better, faster, and at lower cost. Take KRW Hand-operated presses for example: they give more power with less effort...combining faster ram travel with a quick-acting finger controlled valve that makes the KRW Press outstanding in efficient hydraulic action. Twin pumps enable operator to vary ram speed. The special "Captain" type handwheel brings the ram to the work fast as well as providing a "built-in" mechanical press for the lighter jobs. 30 days delivery guaranteed. Write for prices and catalog.



SAVE with KRW  
AIR-OIL OPERATED PRESSES

2

KRW Hydraulic Presses equipped with our "Speedi-Booster" operate on compressed air, providing tons of pressure at the ram by effortlessly raising or lowering the operating lever. In operation, compressed air enters an air cylinder, the piston of which drives the smaller hydraulic oil piston which, in turn, forces the oil under pressure to the large cylinder piston. Tonnage pressures are dependent upon initial air pressure and size of air and oil cylinders. 30 days delivery.



SAVE with KRW  
MOTOR DRIVEN PRESSES

3

Here is a self-contained power unit that drives KRW Hydraulic Presses. These units can be purchased separately to drive any existing KRW Press. The KRW Motor Driven Hydraulic Presses are low-cost, production units ideally suited for short runs or small work.

Presses are equipped with Seco Radial type pumps in capacities ranging from 3,000 to 10,000 PSI. Guaranteed by both the manufacturer and K. R. Wilson. Write for prices.

K. R. Wilson, 215 Main St., Buffalo 3, N. Y.

13.

Please send me information regarding

KRW Hand-operated Presses

KRW Air-oil Operated Presses

KRW Motor Driven Presses

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

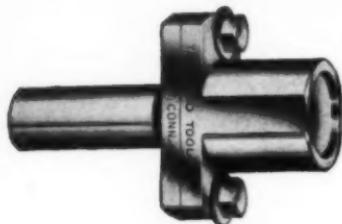
K. R. WILSON  
215 MAIN ST., BUFFALO 3, N. Y.

# The New ALCO REVOLVING STOP

Economical • Rugged • Dirt Free

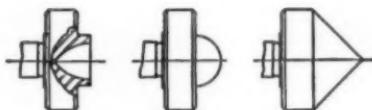


ALCO  
REVOLVING STOP



ALCO  
COMBINATION  
ROLLER STOP AND  
SUPPORT

Sealed bearings prevent chips and dirt from penetrating into the ball race. Smooth, free-running operation is the result, with no sticking. Retain accurate lengths with no marring of the ends of the work with this new and improved revolving stop. It costs less to use this efficient Alco stop than it would a home-made stationary stop.



For long pieces or where very accurate forming operations call for absolute rigidity, this combination tool supports the work and revolves with it. There is no friction as with a stationary support, and interchangeable rotors can be furnished to fit any end shape.

SEND FOR CATALOG

## ALCO TOOLS

THE ALCO TOOL CO., 252 Birdseye St., Bridgeport, Conn.  
CHICAGO OFFICE: 608 SO. DEARBORN ST.  
Phone WEBster 2868

# GRENBY

## HYDRAULIC

# GRINDING

## MACHINES

### FEATURES

- Infinitely Variable Longitudinal Traverse
- Hydraulic Cross Feed
- Coolant
- Precision Spindles
- Heads Swivel For Angle Work
- Grinding Heads To Convert For Internal Grinding (See Cut)

### EG103 SPECIFICATIONS

Work Capacity—3" Dia. x 10' Length

Workhead Accommodates—Collars 1" Max. Hole

—Chucks & Face Plates 4" Max.

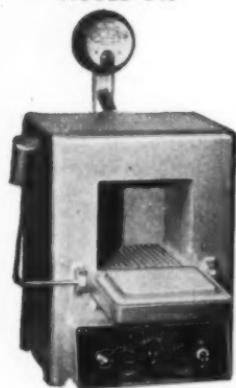
Floor Space & Wt. 45" Long x 25 Wide—1600 lbs.



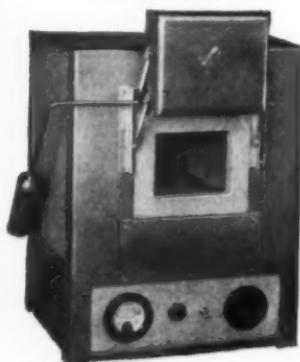
THE  
GRENBY MANUFACTURING  
COMPANY  
PLAINVILLE, CONNECTICUT



MODEL GTP



MODEL CEA



MODEL OFE

# TEMCO

## ELECTRIC FURNACES

With the new TEMCOTROL stepless control you can select and hold any desired temperature.

**Model GTP**—interior 4" x 3 3/4" x 3 3/4". May be operated continuously up to 1500° F. and intermittently to 1850° F. Embedded heating element. Power consumption 1.2 kw. Cast aluminum body. Weight 15 pounds.  
For 115V A.C. .... **Price \$50.00**  
Also available for 230V and D.C.

**Model CEA**—interior 4 3/4" x 4 1/4" x 6". Maximum continuous temperature 2000° F. Element is embedded for its protection and surrounds muffle chamber for uniform heating. Power consumption 1.5 kw. maximum. Insulated aluminum body. Weight 31 pounds.  
For 115V A.C. .... **Price \$80.00**  
Also available for 230V and D.C.

**Model OFE**—interior 6" x 5" x 10". Maximum temperature 1600° F. continuous, 1900° F. intermittent. Synchronous motor driven control. Heating element covers four sides of chamber. Steel frame with 4 1/2" insulation. Maximum power consumption 2.2 kw. Weight 130 pounds.  
For 115 or 230V A.C. .... **Price \$194.00**

TEMCO furnaces have low initial cost and are economical to operate as nearly all the power is consumed within the heating chamber. They are fast heating and ideal for general laboratory uses, heat-treating and small unit production.

See your supply house or write for literature giving detailed specifications

486 WEST LOCUST ST., DUBUQUE, IOWA

**THERMO ELECTRIC  
MANUFACTURING COMPANY**

# CONSTANT PRESSURE



## NORGREN REGULATOR

**1—Floating diaphragm** cushioned for flexibility, insures quick action and long life; prevents rupture and shear. **2—Baffle plate action** positively controls diaphragm, causing more decisive opening and closing of valves and ports. **3—Syphon tube** opens valve faster, permitting a greater volume of air to pass with less pressure drop than conventional regulators. **4—Interchangeable parts**, easily removed without removing valve from airline.

Get **MORE** from air power—use Norgren Regulators. Write for catalog #400.

C. A. Norgren Co.,  
222 Santa Fe Drive,  
Denver 9, Colorado.

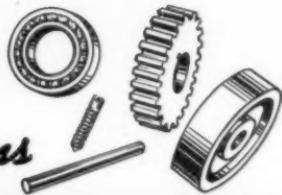
*Norgren*

Make the job easier for all air tools and cylinders. Do it quicker. Control air power with Norgren Regulators. No chatter or fluctuation. Easily and quickly adjusted to fit the right power to the job.

Peak performance of Norgren Regulators is due to four basic points ...

# SCHAUER SPEED LATHES

for Secondary Operations



Polish  
De-burr  
Lap  
Finish  
**SMALL  
PARTS**



## CUT FINISHING COSTS - SPEED PRODUCTION!

Finish your small metal and plastic parts more accurately, more uniformly, more speedily - at far lower cost - with a Schauer Speed Lathe. There is a type and size for almost every secondary finishing operation. See how you can cut finishing costs in your plant.

Write for Descriptive Catalog 440

# THE SCHAUER MACHINE CO.

Originators of Today's Speed Lathes

2064 READING ROAD

CINCINNATI 2, OHIO

**THE CONE AUTOMATIC MACHINE COMPANY**



*sees many  
GOOD THINGS AHEAD*

*It is reported that . . . . .*

Westinghouse calls its new steel encased motor the most revolutionary change in construction in 58 years and states that it delivers up to 134% more power per pound than previous motors.

*get ready with CONE for tomorrow*

Federal Telephone and Radio Corporation will conduct experiments with television, FM and radar in a building at Nutley, N.J., which will be completely shielded from atmospheric electricity.

*be ready with CONE for today*

Called the world's largest, a spot welder that can make 48 welds at a single stroke is in use at Pullman-Standard Car Manufacturing Co.

*get ready with CONE for tomorrow*

A division of Reynolds Metals Company has a new line of all-aluminum bicycles and scooters.

*be ready with CONE for today*

Raytheon Mfg. Co. has an electronic kitchen range. The food is put in a disposable dish and quickly cooked by the energy from a magnetron tube.

*get ready with CONE for tomorrow*

Bell Telephone Laboratories report that they have developed a tube that will send a hundred million words per minute by telegraph.

*be ready with CONE for today*

The Army Air Force has contracted with Fairchild Engine and Airplane Co. for fundamental research in the use of atomic energy in aircraft.

*get ready with CONE for tomorrow*

Aluminum Co. of America has recently supplied a 100-foot all-aluminum span for a railroad bridge at Massena, New York.

The Souhegan Mills of Wilton, N. H., believes that its molded board, made of shavings, can compete in price and utility with plywood or lumber.

*be ready with CONE for today*

The U. S. Bureau of Mines finds that Freon II is more effective in fighting gasoline fires than any of the other gases tested.

*get ready with CONE for tomorrow*

Patent 2,404,206 has been granted for a method of mining practically pure copper by dissolving it chemically and accumulating it electrolytically.

*be ready with CONE for today*

Nylon drive ropes are said by Plymouth Cordage Company to reduce machine shut-downs.

**FOLLOW THESE PAGES FOR NEWS OF PROGRESSIVE PRODUCTION**

The behavior of piston rings and oil films has been studied by the National Advisory Committee for Aeronautics by using a glass engine cylinder.

*get ready with CONE for tomorrow*

When their new 2-million volt machine is installed, Babcock and Wilcox Co. will have 12 X-ray machines in use for checking steam generating equipment.

*be ready with CONE for today*

Blaw-Knox has built two 23-cubic yard clamshell buckets for unloading coal on Lake Superior. They weigh nearly 14 tons apiece and are believed to be the largest of their kind.

*get ready with CONE for tomorrow*

Scientific American prophesies that the use of silicones will bring about a revolution in surface finishes comparable to that resulting from the development of nitrocellulose lacquers.

**Give soft jobs to  
any Automatic**



**put the tough ones on a CONE**

From 65 mm 3312 stock, a 24" Six Spindle Conomatic, with 13 HSS tools, produces the part shown here in 71 seconds.



*Ask your CONE representative to show you our new color motion picture*

**CONNE**

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

# 1

# MOTOR TOOL LIVE CENTER

WILL *Outlast* A BASKETFUL  
OF *Ordinary* Centers

*Here's Why!*

You no longer have to guess whether you are overloading MOTOR TOOL Live CENTERS. When the load is too great a RED BAND around the spindle disappears into the housing. You can see at a glance when overloading occurs.

This is an exclusive feature, developed by MOTOR TOOL, that cuts MOTOR TOOL Live CENTER repairs to practically nothing—immeasurably **INCREASES** their life—and puts an end to burnouts, breakdowns and work spoilage.

Write  
for NEW  
Descriptive  
Folder

## MOTOR TOOL MANUFACTURING CO.

METAL CUTTING TOOLS

7773 CORTLAND AVENUE • DETROIT, MICHIGAN

*Make it a Rule  
to Call Motor Tool*

# "KNOCK-OUT" EXPANDING MANDRELS



Fast — Positive — Accurate . . .  
Save machine time, reduce operator fatigue, eliminate special mandrels. Ideal for all turning and grinding operations. Sizes to handle from  $\frac{3}{8}$ " hole to  $5\frac{1}{2}$ " hole.



Production turning 45° on 11 lb. casting held on M4 Expanding Mandrel.



Turning small piece in tool room, I. D. 12.32" held on M4 Expanding Mandrel.



Production grinding 45° angle holding .001" concentricity. Using M3 Expanding Mandrel.

## "KNOCK-OUT" CHUCKS

The tougher the job the tighter it grabs the tool. This self activating chuck eliminates slipping . . . marred and bent shanks. Yet it can *always* be loosened by hand. Saves Time —Reduces Tool Costs.

Ask your nearest supplier or mail the coupon today!



**K.O. LEE  
COMPANY**  
MANUFACTURERS OF  
MACHINING TOOLS  
AND AUTOMOTIVE  
MANUFACTURING EQUIPMENT

ABERDEEN, S. DAK.

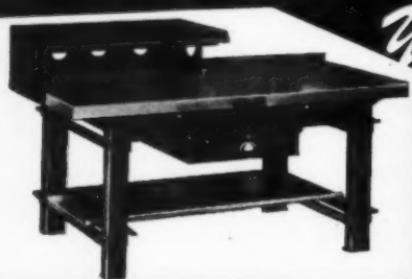
**K. O. LEE COMPANY**  
1115 First Ave. S. E., Aberdeen, South Dakota  
Please send us illustrated literature on  
 "Knock-Out" Expanding Mandrels.  
 "Knock-Out" Keyless Self Activating Chucks.

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# PRECISION BUILT!



*Yes, CHALLENGE  
WORK BENCHES  
are Precision Built.  
They are not of the  
Hammer-and-Saw Variety*

Accurate work requires an *always smooth, level, unyielding* Work Bench. A Challenge Bench gives you all this.

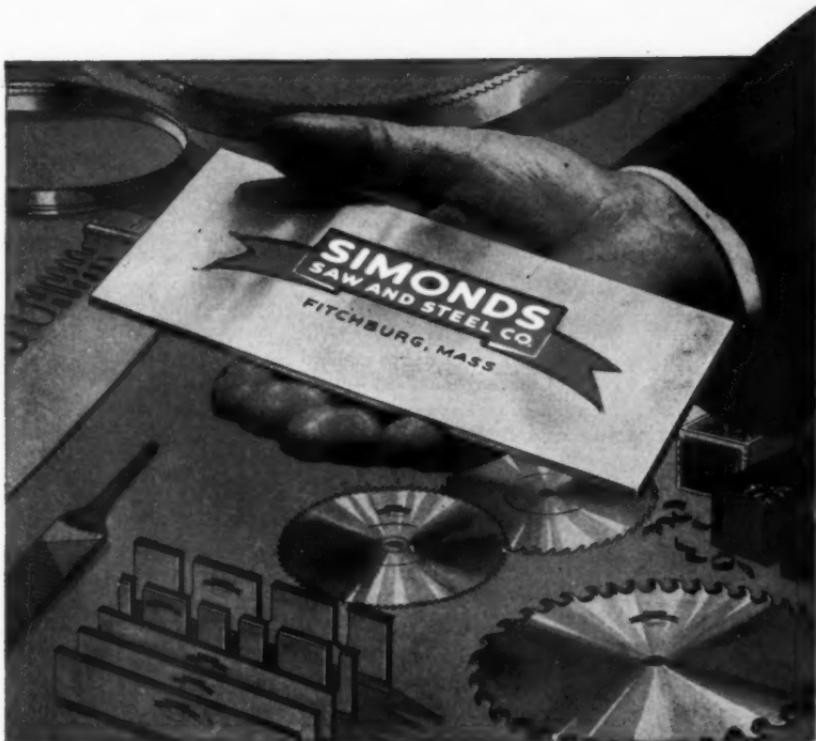
- The rugged, two inch, cast iron top is carefully machined on top and on *all four edges* at right angles. You can depend on their accuracy.
- The top is supported on sturdy steel channel legs welded into a rigid framework by cross angles. The long channel supports are provided with lock leveling screws by which the top can be kept perfectly level at all times. The lower braces are high enough above floor to permit moving by standard lift truck.
- Tool box shelf at one corner gives added capacity as do the steel drawer and full length shelf below top. Drawer has pilfer-proof lock.
- Built in four standard sizes 28 inches wide and 48, 60, 72, and 84 inches long in three styles (1) complete as illustrated, (2) with tool box shelf and without drawer, or (3) without tool box shelf or drawer.

WRITE for Complete Catalog of Challenge Precision Equipment. Including Layout Surface Plates, Bench Plates, Lapping Plates, Straight Edges, Parallels, V-Blocks, Right Angle Irons and Angle Plates.



**THE CHALLENGE MACHINERY CO.**

GRAND HAVEN, MICHIGAN, U.S.A.



## *This RED BADGE of Merit IS WELL-EARNED BY ALL PRODUCTS THAT WEAR IT*

This "ribbon-etch" marks the products made by the longest-experienced manufacturer of cutting tools. And this mark means these 4 things:

1. It means that the product is made of special steel, usually from Simonds' own modern electric steel mills.
2. It means that the product is fabricated in the world's first windowless plant, where all working conditions are constantly controlled to keep workers' well-being and product-quality at top level.
3. It means that the product has been tested and re-tested to make sure you get full Simonds quality in every order. (There's no "second grade" in this line.)

4. It means that the product is represented, *to you*, by Simonds cutting-tool engineers...and by distributors and dealers...whose engineering judgment and sales counsel is as sound as the product itself.

And wherever this mark appears in *your* operations, *it will mark a deep cut in your cutting costs.*

**SIMONDS** CUTS YOUR CUTTING COSTS ON METAL, WOOD, PAPER, PLASTICS

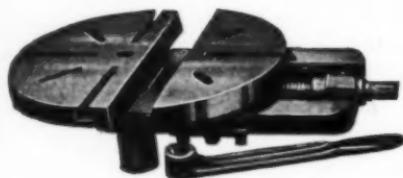
**SIMONDS**  
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making Quality Products for Industry

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# Use the COMBINATION DRILL TABLE and VISE



## SPEEDS DRILL PRESS SET-UPS

Simplifies the most difficult set-ups. Holds work of all shapes securely, without angle plates, clamps or supports. Just drop in the work and start to drill.

The Combination is made in various sizes — diameters from 8" to 27½", weighing from 27 to 600 lbs. Made of the finest materials, for long life. Easy to install. Specify shank diameter in thousandths of an inch. We supply the drill table and vise with shank turned to size specified.

### GUARANTEE

We guarantee the Combination will save its cost in labor alone in six months. You are the judge.

### FREE TRIAL

We will ship to rated concerns under this guarantee, on free trial. Should you decide not to keep the tool we will even pay return transportation. Order Today!

Circular on Request.



WRITE TODAY  
FOR  
CIRCULAR

*Gives full information and illustrates typical, set-ups. Shows use on radial drills. Complete specifications of all models including the square, all steel tables.*

**MODERN MACHINE TOOL CO.**  
*Jackson, Michigan*



*Mall*  
REG. U.S. PAT. OFF.

**HEAVY  
DUTY**

## **INDUSTRIAL GRINDERS**

3 H.P. Geared Head—4500 r.p.m.;  $\frac{3}{4}$ , 1,  $1\frac{1}{2}$  H.P. Direct Drive—3450 r.p.m.;  $\frac{3}{4}$  H.P. Countershaft models—1650 to 7400 r.p.m., are available with tilting, swiveling, dust and vaporproof or ventilated electric motors, and pedestal, low caster and overhead hanger-bail mountings. Light-weight working tools for Grinding, Sanding, Wire Brushing, Drilling and other jobs are quickly interchanged.

Ask your Supplier or write for literature and prices.  
FLEXIBLE SHAFT DIVISION

## **MALL TOOL COMPANY**

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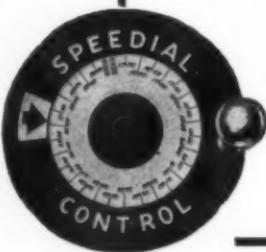
★ 25 Years of "Better Tools For Better Work" ★

# BUFFING AND POLISHING MACHINES

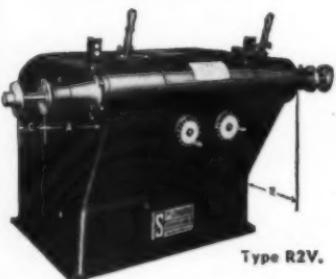
DIAL YOUR SPINDLE SPEEDS  
AND YOU LOWER YOUR COSTS!

ANY SPEEDS FROM  
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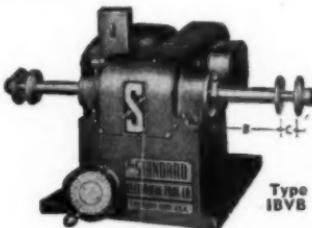
INSTANTLY



"Speedial" Control gives  
you peak wheel efficiency  
in your buffing and pol-  
ishing operations.



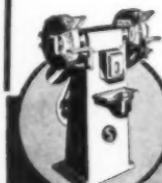
10 H.P. (Two 5 H.P. Motors)  
15 H.P. (Two 7½ H.P. Motors)  
(Each operator is independent of  
the other)



1 H.P. Bench Model  
Also: Pedestal Models 1, 2, 3, 5  
and 7½ H.P.

"SPEEDIAL" CONTROL ON  
8 MODELS FROM 1 H.P.  
TO 15 H.P.

- Maintains peripheral speed throughout wheel life.
- Gives you maximum usable wheel life.
- Lower production costs.
- Higher production.



The STANDARD ELECTRICAL TOOL Co.

2486 RIVER ROAD

CINCINNATI 4 • OHIO

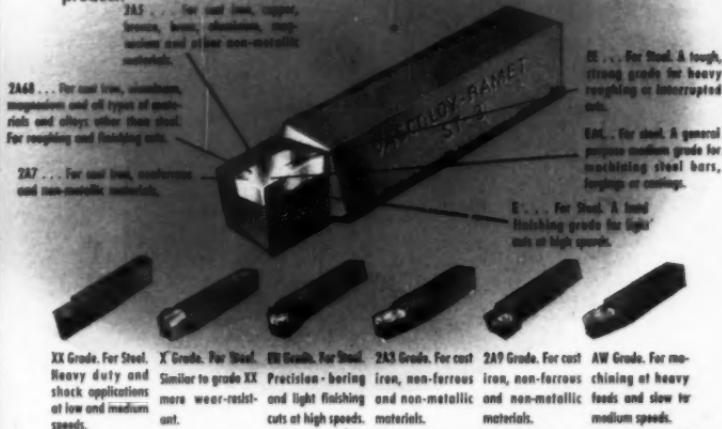
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BULLETIN B2.

# Specify ~~Carbide~~

## VR CARBIDE

... and you specify the finest cemented carbide in industry. There is a V-R GRADE for every type of machining, each the most outstanding in the field. Regardless of your tool requirements, V-R can provide you with the proper tool and correct grade for maximum cutting performance.

**REMEMBER TOOL** . . . Vascoloy-Ramet's research facilities and field engineering service is available to help all manufacturers produce a better and less costly product.



XX Grade, For Steel. X Grade, For Steel. #R Grade, For Steel. #R Grade, For Steel. #R Grade, For Steel.

Similar to grade XX  
more wear-resistant  
at low and medium  
speeds.

Ask your nearest Vascoloy-Ramet Field Service Engineer about "CUSTOMER STANDARDS." Tools made to your design quickly, in any grade or quantity at moderate prices.



**VASCOLOY-RAMET CORP.** NORTH CHICAGO  
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An affiliate of Pennsalt Metallurgical Corporation and Vanadium Alloys Steel Company

Machine Tool Blue Book

DISTRICT SALES AND SERVICE  
IN PRINCIPAL CITIES

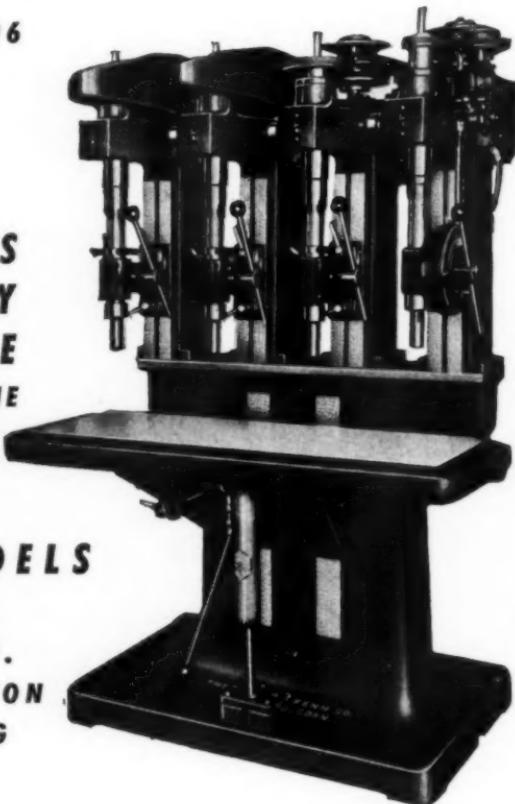
# THE DRILL WITH A HUNDRED AND ONE SPEEDS

4 SPINDLE M96  
RIGHT HAND  
SPINDLE  
POWER FEED

ALL SPEEDS  
INSTANTLY  
AVAILABLE  
WHILE MACHINE  
IS RUNNING

TWO MODELS

M96— $\frac{1}{8}$  CAP.  
M125— $\frac{3}{8}$  CAP.  
BOTH PRECISION  
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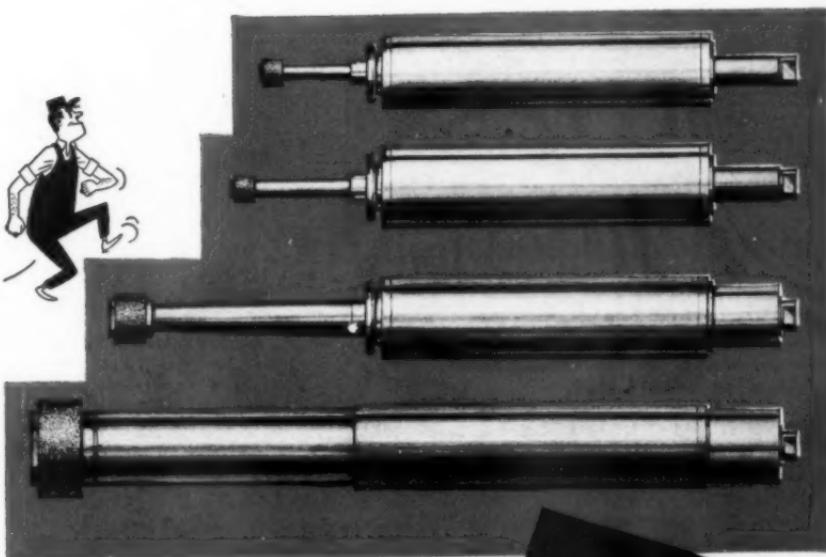


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**THE TAYLOR & FENN CO.** HARTFORD 1, CONN.

Step Up Production of Accurate Sized, Smooth Finished Holes

with **POPE** Sealed Lubrication  
**INTERNAL GRINDING SPINDLES**



Pope Precision Internal Grinding Spindles come in the sizes, shaft extensions and speeds (up to 35,000 RPM) to meet your every need. The four, illustrated, all fit the same machine without changing motor pulley size.



No. 40

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**POPE MACHINERY CORPORATION**  
ESTABLISHED 1920  
261 RIVER STREET • HAVERHILL, MASSACHUSETTS  
**BUILDERS OF PRECISION SPINDLES**

# Talk About PRODUCTION Without DIES!

4,000 PARTS per DAY  
with DI-ACRO Bender

"Enclosed pictures in our plant prove the DI-ACRO Bender will do a real production job. We are making 4,000 completed parts per day which is competitive to most Power Presses." (Name on Request.)

Here is an example of "DIE-LESS DUPLICATING" typical of a great variety of formed parts readily made with DI-ACRO Precision Machines, — Benders, Brakes, Shears. Picture below shows the DI-ACRO Bender making an acute right angle bend and photograph above shows the finished part formed to die precision. Women operating DI-ACRO units maintain a high out-put on production work.



DI-ACRO is Pronounced "DIE-ACK-RO"



## DI-ACRO Shear

Squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. 3 sizes. Shearing widths, 6", 9", 12".



## DI-ACRO Brake

Forms non-stock angles, channels or "Vees". Right or left hand operation. 3 sizes. Folding widths, 6", 12", 18".

## Send for Catalog

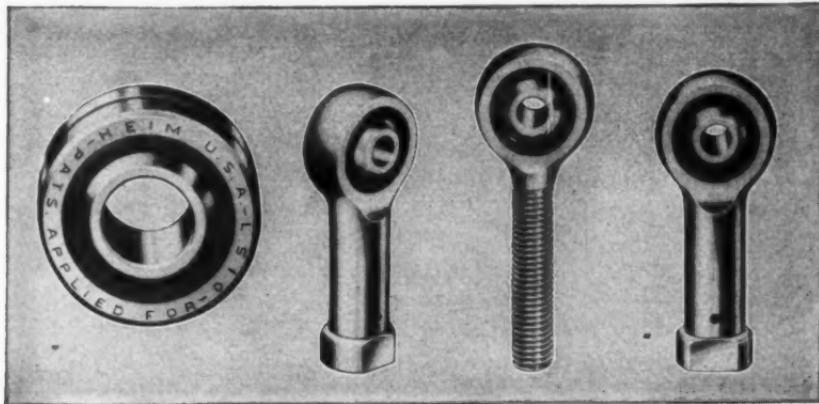
showing DI-ACRO Precision Machines and many examples of parts made with "DIE-LESS DUPLICATING".



**O'NEIL-IRWIN mfg. co.**

314 EIGHTH AVENUE

LAKE CITY, MINNESOTA



# HEIM

## SPHERICAL BEARINGS AND SPHERICAL BEARING ROD ENDS

Out of this war have come many new devices and improved methods, but one which has already received the acclaim of the aircraft industry in particular is the revolutionary design and construction of these Spherical Bearings and Spherical Bearing Rod Ends.

We are now prepared to offer to American industry in general the complete line of Heim Spherical Bearings and Rod Ends which open up an entirely new field of application wherever this type of bearing is used.

With a greater surface contact area than any of the conventional types, these bearings have a greater carrying capacity and will take radial and thrust loads heretofore thought to be impractical. Where maximum misalignment is essential, nothing can take their place.

We invite your inquiries and offer the services of our Engineering staff for any assistance you may desire. We have just issued our catalog covering standard sizes and designs now available, and will mail one on request.

THE HEIM  
FAIRFIELD



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# Let MEAD'S STEEL-FINGERED GIANTS DO THAT JOB

*Faster, Better, Cheaper*



Besides the standard, ready-made fixtures for the application of Air Power, (such as the Air Press, Air Vise, Air Chuck, Air Clamp) Mead offers a wide selection of air cylinders which can be used in special jigs and fixtures. Illustrations show four types of double-acting cylinders which can be furnished in five different bores with optional length of stroke.

## Use MEAD AIR POWER

Get faster, more economical production set-ups—investigate the entire "family" of Mead Air-Operated devices. Do you want

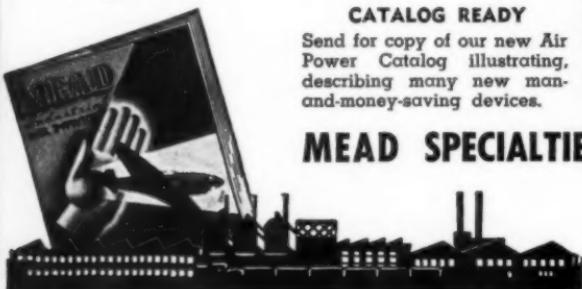
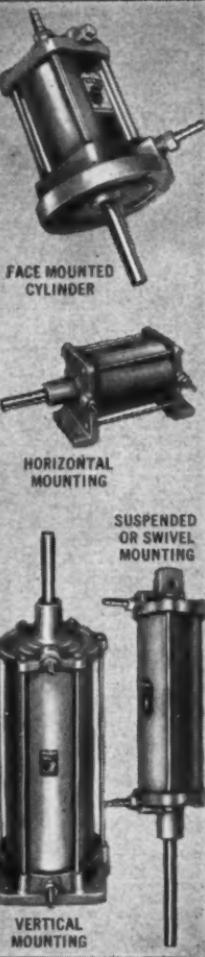
to move things—lift them, slide them, tilt them—or hold them firmly? Mead Air Power will do it. Do you need a delicate flexible touch—or tremendous power? Mead Air Power has both.

### CATALOG READY

Send for copy of our new Air Power Catalog illustrating, describing many new man-and-money-saving devices.

## MEAD SPECIALTIES COMPANY

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Chicago 41, Ill.  
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# ACRO DIE SET FULLERS

The principle of the Acro Die Set Fuller is to remove the punch holder from die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving both leader pins simultaneously. This can be accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented by Acro feature, found only on Acro Die Set Fullers.

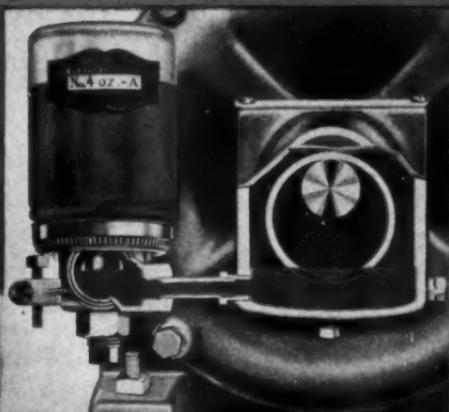
Dual visibility — Sight glass on side of lubricator bowl on exclusive SUPER feature, shows exact oil level maintained in bearing plus oil supply in reservoir, eliminating guess work.

There is no drippage, no waste, no over flow. Oil is automatically fed to the bearings as required.

Nationally known authorities estimate that 75 per cent of all machinery repairs are caused by inefficient and improper lubrication, and that \$5 per cent of the oil bought for lubricating purposes is never used by the bearing surface for which it was intended. **WRITE FOR LITERATURE.**

Order a set today. Convince yourself of the savings you can make in your tool room. ACRO FULLERS furnished in three sizes. Write now for more information.

## SUPER LUBRICATOR . . .



# ACRO

PROMPT  
DELIVERY

## METAL STAMPING COMPANY:

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In Cylinders from 2" to 14½" in Diameter

## SUNNEN Portable Cylinder Hones

Provide Smooth Accurate Internal Finishes



Standard Model  
Range 2½" to 14½".

Junior Model  
Range  
2" to 2.6".

These hones provide a fast, easy, practical, economical way to produce internal finishes that are guaranteed to be accurate within .0005". Straight round holes are produced without disturbing previously established alignment. Sunnen Portable Cylinder Hones produce any commercially required finish with full bearing surface. They correct errors of out-of-round, taper, bell-mouth, wavy condition, distortion—and remove tool marks or other surface imperfections.

With Sunnen Portable Cylinder Hones stock removal is fast. They are portable, can easily be taken to the job. Free floating universal joint permits operating at an angle. Adjustment is simple, easy and positive. Easy to use, can be set up for operation in one minute. Handles any metal or plastic except lead and babbitt.

Sunnen Portable Cylinder Hones are ideal for Selective Fitting of Mating Parts—Small Lot or Odd Size Production—Salvage and Production Repairs—Maintenance of Operating Equipment.

If you have an internal finishing problem, call a Sunnen Engineer—or write for free bulletin, form No. X-AN5001.

**SUNNEN**  
MANUFACTURERS OF  
PORTABLE CYLINDER HONES

Sunnen Portable Cylinder Hone  
saved dismantling this machine  
to install a new boring bar.

Portable End Clamping Fixture  
enables part to be honed accurately  
without distortion.

Sunnen Hone and Stone  
Support handles large  
diameter cylinders easily.

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# Hammond

OF KALAMAZOO



PROMPT  
SHIPMENT  
EITHER BENCH OR FLOOR TYPE  
VISIT OUR BOOTHS 235 & 239, WESTERN  
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MARCH 22-27

# FLEXIBLE

## BELT GRINDERS

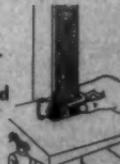
Grinding or  
polishing  
shaped  
handle with  
free belt.



Grinding  
true radius  
with formed  
platen.



Grinding  
inside surfaces of  
"U" shaped  
parts on  
platen.



The Model F-2 Flexible Belt Grinder-Polisher is the answer to many trouble-some problems of grinding, polishing, deburring and chamfering of irregular shaped parts. Uses abrasive belts  $\frac{1}{2}$ " to 2" wide. Above are shown just a few of the operations quickly done on the F-2.

Mr. Superintendent — Why not take a walk through your Tool Room, Machine Shop, Polishing and various other departments to see if you do not have grinding, deburring and "clean up" jobs which can be handled BETTER, FASTER and AT LOWER COST on the F-2? You may be surprised at the time being spent on certain operations which can be done in a matter of seconds on the F-2.

# Hammond Machinery Builders

1614 DOUGLAS AVENUE • KALAMAZOO, 54, MICHIGAN

# SPIRAL POINT TAP USERS . . .

## Check Your Tap Sharpening Efficiency



YES NO

1. Is the machine on which you sharpen taps always available—ready to use—without the necessity of setting up an attachment, truing it up, etc.? .....
2. Can you sharpen even the smallest sizes, i.e. No. 0 or No. 1? .....
3. Is the tap supported at the end during sharpening—to eliminate vibration? .....
4. Are all spiral flutes the same depth and length? .....
5. Can you maintain uniform shape and size of flute? .....
6. Do you get positive rake the full length of spiral flutes? .....
7. Can you also grind the full length of the straight flutes? .....
8. Is your method free from operational and dust hazards? .....
9. Can you grind wet or dry—as you choose? .....
10. Can you grind FAST—a flute every three or four seconds? .....

The ONLY MACHINE that can answer "YES" to all of the above questions is the most modern Spiral Tap Grinder on the market: The BLAKE FLUTE GRINDER. The coupon below will bring you the complete details.

Please send me a free copy of Bulletin No. 466 which gives complete details on the Blake Flute Grinder.

H.

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

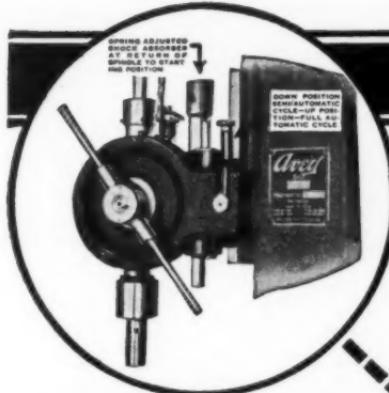
STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

**EDWARD BLAKE CO.**  
634 COMMONWEALTH AVE.  
NEWTON CENTRE 59, MASS.

BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS—BLACK DIAMOND PRECISION DRILL GRINDERS—WALTHAM CUTTER SHARPENERS

*Avey* FEATURE No. 4



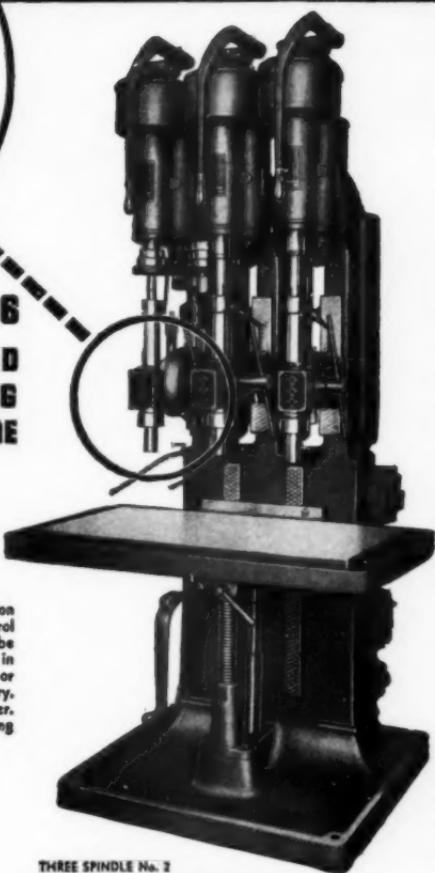
**THE *Avey* TYPE MA-6  
AVEY-MATIC POWER FEED  
HAND FEED AND REVERSING  
MOTOR TAPPING MACHINE  
features**

**single lever control  
for automatic or  
manual operation**

Single lever control — feed engaged with forward motion of feed lever. Automatic disengagement by dog control or by single hand lever. AVEY automatic feed may be applied to any or all spindles. Worm and worm wheel in constant engagement, running in oil. No friction shoes or dogs that require replacement. No adjustment necessary. Quick advance or over-running feed by hand feed lever. Can be arranged for full automatic cycle by changing position of handle at rear of unit.

Type MA-6 is made in following capacities:  
No. 2 —  $\frac{3}{8}$ " capacity in cast iron.  
No. 3 —  $1\frac{1}{4}$ " capacity in cast iron.

**THE AVEY DRILLING MACHINE CO.**  
CINCINNATI • OHIO • U. S. A.



**THREE SPINDLE No. 2  
TYPE MA-6 • COMBINATION MACHINE**  
1st Spindle - Avey-matic Feed  
2nd Spindle - Hand Feed  
3rd Spindle - Tapping (Reversing Motor)



# Bodine..Case History N° 20

End mill 3/16" diameter spot on second hole



Drill .180 dia. hole 7/16" deep on second hole



Drill .101 dia. hole 3/8" deep from bottom of .180 dia. hole, counterbore to .130 dia. to 5/32" depth and square bottom of .180 dia. hole (combined blind hole)



Same as at Station 5, but on set and hole



Top 5-40 hole on .101 diameter

Top 5-40 hole on .101 diameter — second hole



a. Automatically unclamp part in fixture (side arm)

b. Automatically open fixture clamping gate

c. Automatically eject part from fixture



Processing a powdered metal (bronze) latching cam

Drill .180 diameter hole 7/16" deep

End mill 3/16" diameter spot

Automatically clamp part in fixture (side arm)

Automatically close fixture clamping gate

Hold load blank to fixture type dial

Bodine Dial Type Automatic Drilling and Tapping Machines with 6 drilling, 2 tapping spindles. Tool to drill, counterbore, and tap two screw holes. Production: 100 pieces per 50 minute hour.

THE  
**Bodine**  
CORPORATION  
BRIDGEPORT, CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING,  
TAPPING AND SCREW INSECTING MACHINES

# IT PAYS TO KNOW Your KENNAMETAL GRADES!



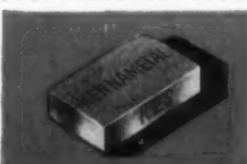
Most crater-resistant Kennametal tool material—gives outstanding service for finishing or moderate cuts on carbon and alloy steels .30% carbon and higher. Also time-and-money-saver for general use on soft steels containing less than .30% carbon, precision boring of steel where .004" feed or over is used, and for many milling jobs on steel. 92 Rockwell A hardness.



The hardest Kennametal tool material grade—specifically for solid tools used on precision boring of steel parts. Its high hardness, great resistance to cratering, and unusual strength can help you cut costs where fast, accurate work is essential. 93.2 Rockwell A hardness.



Strongest crater-resistant Kennametal tool material—saves tooling and production costs when taking rough cuts on carbon and alloy steel forgings, bar stock, etc., having carbon content of .30% and higher. Also outstanding for milling of steel at heavy chip loads. 91 Rockwell A hardness.



A very strong Kennametal tool material, particularly suitable for roughing cuts on steel castings. Its high resistance to abrasion and edge wear of sand inclusions makes possible exceptionally high rate production, and economical tooling costs. 91.5 Rockwell A hardness.



Highly resistant to edge wear—takes a good edge—a money-saving tool material for very light finishing cuts on steel and for precision boring with less than .004" feed. Ideally suited for tools requiring large nose radius or where tool must dwell without cutting. Excellent for milling, and very rough cutting of brass, bronze, and aluminum alloys. 92.3 Rockwell A hardness.



Reduces cost of machining cast iron. Extremely hard, straight tungsten carbide tool material having unusual strength. Holds keen edge, withstands shock of interrupted cuts on rough, sandy, or chilled castings. Also outstanding for finishing and precision boring of cast iron. 92.2 Rockwell A hardness.

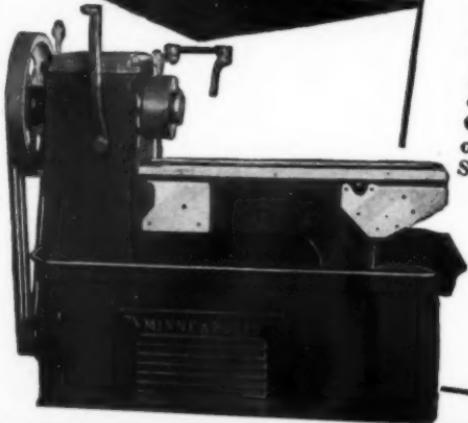
**KENNAMETAL** Blanks are now sold  
in Economical "Package Lots"  
For Prices and Particulars Send for Catalog 44



**KENNAMETAL**  
SUPERIOR CEMENTED CARBIDES  
KENNAMETAL, INC., LADONDA, PA.

# WHY BUY LATHE PARTS YOU NEVER USE? Consider this ECONOMY set-up!

Here's the  
**BASIC LATHE**



**ADD Your Choice of  
Drives and Equipment**

Single speed, four speed, all-electric multi-speed and low speed chain drives. Manual or air operation of collet, expanding mandrel or chuck.

Cross-slide with hand screw or rack and pinion feed. Six station flat turret and self-indexing stop. Manual capstan operated carriage.

Power feeds for turret, carriage or cross-slide. Special equipment designed for your work.

## **"BASIC UNIT + PARTS" PLAN of the MINNEAPOLIS PRODUCTION LATHE**

You can save money on production lathes—and further hold down your cost by adding only the equipment needed for your particular job! When you buy the MINNEAPOLIS Lathe, you get a high speed, heavy duty model with large spindle capacity—a machine that takes heavy cuts without "chatter" and increases your output. 2 1/4" Spindle capacity, 14" swing, 4 different drives. Let us quote you on a "tailor-made" lathe for your work. Simply send sample part or drawing.

**CENTRAL MACHINE WORKS CO.**

Machinery designers and manufacturers  
since 1890

1250 Central Ave., Minneapolis 13, Minnesota

WRITE FOR  
BULLETIN



# THIS NEW MADISON ROUGH BORING TOOL SLASHES HOLE COSTS!

This new Madison Rough Boring Tool is the fastest changing, fastest cutting boring tool made. Team it up with the Madison Recutting Cutter and you'll get more accurate finely finished holes at lowest cost. Like the Madison Recamer, the Roughing Cutter can be easily set to decimal sizes within its range. Because cutters may be presized, disturbance of the setup is unnecessary when inserting a new or sharpened cutter in the bar. Cutter change is a matter of seconds. Simply back off the lock screw in the bar and the cutter slips out for resizing or replacement.

The Madison locating feature automatically centers the cutter in the bar, equalizing the load on cutting elements.

The cutter block is formed by the Madison cutting blades themselves. This exclusive Madison feature creates a more rugged cutter with no delicate mechanisms or separate parts. Madison Roughers have been used to bore holes as large as 17.590 and are made in the smaller range to 1" size.

These exclusive Madison features of simplified design are the reasons why the new Madison Rough Boring Tool performs with amazing speed. On field tests, stock removal requiring three passes with a conventional single point tool was executed in one pass with this new Madison Rougher.



Write for the Madison catalog today. Get the facts on Madison Boreamers, the tools that make one operation out of boring and super finish reaming.

**MADISON**  
MANUFACTURING COMPANY  
DEPT. BB-5  
MUSKEGON, MICHIGAN



*Fast roughing...High finish*

**ABRASIVE**

**M-34**

**VERTICAL SPINDLE  
SURFACE GRINDER**



**Work Capacity:** 24" long, 8" wide, 12" high.  
**Spindle:** Built-in 5 hp motor, 3450 R.P.M. ball and roller bearing. **Wheel Size:** Segment type, 6" diam.  
**Table Size Overall:** 59" x 10 1/2". **Net Weight:** 3000 lbs.

**ABRASIVE**

**ACCURACY BOOSTS PRODUCTION**

**REMOVES 1/32 INCH ON  
MOLYBDENUM STEEL  
WITH 10 MICROINCH FINISH**

The ABRASIVE M-34 with motorized spindle using a 24 grit wheel removes 1/32" from each side of this molybdenum steel oyster dredge bar tooth. Fast and accurate, it produces 40 pieces per hour — to a 10 microinch finish. For grinding small flat dies, washers, punches, parallels, raising blocks and similar work the M-34 is ideal. The motorized spindle delivers 5 h.p. directly at the cutting point without gearing or belting. There's no warm-up period with the M-34 . . . it grinds to close tolerances immediately upon starting. The one-piece bed casting minimizes vibration and assures lifetime accuracy. Table feeds are automatic, with hydraulic shock absorber to cushion table reversal. Standard equipment includes wet grinding attachment with motorized pump, tank, etc.

*Write for detailed Bulletin.*

For information regarding Abrasive Machines on the Government Surplus Tool List, send us the serial number of the machine. We will endeavor to provide attachments, accessories and repair parts as desired.

# DEEP-HOLE DRILLS

—for drilling extremely deep holes from the solid in either ferrous or non-ferrous metals.

## GUN DRILLS — SPADE DRILLS

•  
*Specialists —*

in the design and manufacture of DRILLS for difficult drilling operations.

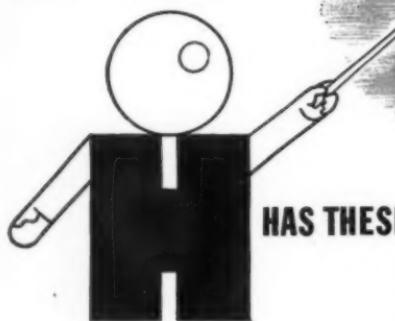
# Conner

TOOL & CUTTER CO.

1000 EAST McNICHOLS ROAD  
DETROIT 3, MICH.



# the NEW HOFFMAN DISC FILTER



## HAS THESE OUTSTANDING FEATURES

- LOW INITIAL COST
- OCCUPIES LIMITED SPACE
- NO MOVING PARTS
- EASY TO CLEAN
- EASY TO INSTALL

The Hoffman Disc Filter can be installed either singly or in units and delivers a continuous flow of clean coolant. Ideal for use where space is limited and low initial cost is a factor. The removable disc element can be quickly and easily cleaned and re-used. Maintenance costs are kept at an absolute minimum.

The Hoffman Disc Filter will remove dirt particles measuring from 3 to 5 micro inches and is being successfully used on screw machines and thread rolling coolants, diesel engine lubricating oils, hydraulic oils and various wash oil applications.

★ SEND FOR LITERATURE

**U. S. HOFFMAN** MACHINERY  
COOLANT FILTERS • FILTRATION ENGINEERING SERVICE  
CORPORATION  
215 Lamson St., Syracuse, N.Y.

# TOOLS for PRECISION PRODUCTION

Reciprocating Action (In and Out)

## PORTABLE

*Electric*

### RECIPROCATING TOOL



Motion is "in and out" not spinning or rotary. Tool is portable—light weight—carry it anywhere—easy to handle. Self contained. Ready to plug into any 110 volt electric outlet. Use it to work on any metal, wood, plastic or other materials that may be filed, sawed or polished. Delivers 1000 strokes per minute, much faster than hand methods. Complete line of files, scrapers, hones and other accessories available.

### ROTARY TABLES

A useful addition to any shop doing a variety of work. Often takes the place of a costly fixture.

**UNIVERSAL**—With exception of Model BH-9, all tables are so designed that a dividing attachment may be purchased at any time after table is in use.

**THROWOUT WORM**—May be disengaged easily. Re-engaging it does not throw it out of adjustment.

**HANDWHEEL**—is shaped to fit the hand—quick action type.

**GRADUATIONS**—Are cut on a special graduating machine. Degrees are indicated on the platen, minutes are on the dial.



MODEL BH-12

Rotary table may be used for work on milling machines, shapers, drill presses and horizontal boring mills.

PROMPT DELIVERY • WRITE FOR LITERATURE



## ACME TOOL COMPANY

96 WARREN STREET • NEW YORK 7, N. Y.

HOW TO OBTAIN  
increased speed AND closer tolerances  
IN JIG BORING



**NO S-T-O-P and S-T-A-R-T  
TO CHANGE TOOLS AT EACH HOLE**

In the Moore Jig Borer you can *consecutively* spot, drill, bore and ream *all* holes in the work-piece with minimum tool changes. In other words, you don't have to change tools at individual holes for each operation, because there are no size blocks or end measures to labor over.

Accurate lead screws *built into* the Moore Jig Borer enable you to make table settings faster than you can change tools. A glance at your blueprint—a few turns of the micrometer dials and the work is set to precise location. Moore lead screws, accurate to .0002" over 14" of travel and .00005" in any given inch see to that. Another advantage—you make each setting three times, enabling you to quickly notice and correct any errors you may have made.

The Moore Jig Borer is ideally suited for jigs, fixtures, dies, special machine parts and jig-less, small-lot production. It is highly sensitive for holes 1/32" diameter, yet rugged for heavy cuts up to 4½".



**RAPID TABLE SETTINGS  
PROMOTE GREATER ACCURACY  
IN FINISH BORING**

Rapid table settings on the Moore Jig Borer encourage operators to follow the best toolroom practice—roughing *all* holes before finish-boring *any* of them.

Moore lead screws are so fast to set—faster than tool changes—that it *pays* to pre-rough all holes. Temperature changes or stresses caused by roughing cuts *cannot* interfere with finish-boring.

After roughing, the set-up can be easily checked and re-set before taking any finish cuts.

All finish-boring is completed without stressing or heating of the work-piece. These favorable conditions, maintained throughout the entire finish-boring operation, on the Moore Jig Borer, are further assurance of ultimate accuracy in the completed work.



Write today for descriptive literature



**MOORE JIG BORER**  
MOORE SPECIAL TOOL CO., INC., 726 UNION AVE., BRIDGEPORT 7, CONN.



Jump at the opportunity to reduce your milling costs by utilizing Kempsmith standard attachments. These precision-built tools make it possible for you to convert your standard milling machine into a special purpose miller, thereby reducing costs to rock bottom. Kempsmith Attachments, Arbors and Accessories have long proven their ability to handle both delicate tool room jobs and fast production runs. They have the same high degree of precision workmanship and accuracy characteristic of Kempsmith machines for more than 57 years. It will pay you to investigate.

THE KEMPSMITH MACHINE COMPANY, MILWAUKEE 14, WIS., U. S. A.

Let our experienced  
Kempsmith Engineers  
show you how to ap-  
ply Kempsmith Stand-  
ard Attachments to  
your milling jobs.  
There's no obligation  
and it may lead to sub-  
stantial savings in costs.  
Write for literature.



# KEMPSMITH

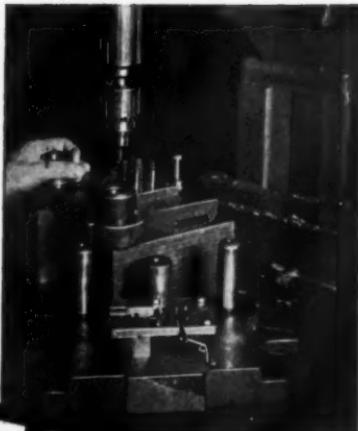
*Attachments  
and Arbors!*

*Precision Built Milling Machines Since 1888*

*for* FINEST DIE SETS  
**PLUS**  
FAST SERVICE

*call* **PRODUCTO**

You will never have to worry  
about the quality of your die  
sets once you place responsibility in the hands of skilled  
Producto experts. What is more, you'll regularly get faster  
and more efficient service from our **SIX** conveniently  
located assembly and service headquarters. Write for our  
catalog No. 9, if you do not have one in your file.



#### THE PRODUCTO MACHINE CO.

980 Housatonic Ave., Bridgeport 1, Conn. • Bridgeport 4-9481

**PRODUCTO SERVICE IS ALWAYS AT THE PHONE ON YOUR DESK**



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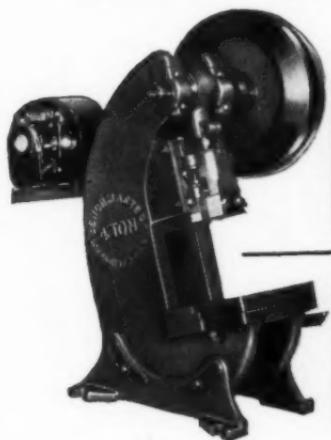
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197 Lafayette St.  
Worth 4-7484

CLEVELAND 14,  
5345 St. Clair Ave.  
Express 1133

LOS ANGELES 21,  
2168 E. Olympic Blvd.  
Trinity 9827

# Benchmaster's\* Improved Model

## 4-TON CAPACITY BENCH PUNCH PRESS



\* World's largest manufacturer of small presses.

Small in Size

MIGHTY in Performance

### FOR STAMPING, MARKING, PUNCHING, RIVETING, FORMING AND OTHER HIGH-SPEED OPERATIONS

Light, compact and powerful, the improved, postwar Benchmaster 4-Ton Capacity Punch Press offers performance formerly found only in far larger models. Its unusual and exclusive features include a cradle base that allows the press to be inclined, a precision-ground shaft keyed by a press fit to a large eccentric to provide shock-absorbing bearing surface, bronze bushings at all wear points, a single trip action that may be made to repeat rapidly by removing a screw located in the collar, automatic knockout, an open back so that work may also be inserted from the front, a new-type floating motor mount which maintains proper tension of the V-belt, standardization of parts for quick, easy interchangeability and many other typical Benchmaster improvements.

For full information about this new Benchmaster Punch Press and other quality Benchmaster machine tools, write to Dept. MT-2

### SPECIFICATIONS:

Weight, 215 lbs.

Height, 27"

Die space, 5 $\frac{1}{4}$ "

Center of bolster plate  
to frame, 3 $\frac{3}{8}$ "

Bolster plate, 6" x 8" x 1 $\frac{1}{2}$ "  
with 2" hole in center

285 strokes per minute with  
1725 R.P.M. electric motor

1" stroke standard

Other strokes up to 2"  
special

**benchmaster**

MANUFACTURING COMPANY  
2952 WEST PICO BOULEVARD  
LOS ANGELES 6, CALIFORNIA



# Electric Hydraulic

## PRESS

—fingertip control

—no hand pumping

Now you can get a press that *completely eliminates hand-pumping*. The new Dake Elec-hydraulic Press provides up to 75 tons from a motor-driven pressure source. And any pressure can be repeated, held, or changed—without stopping the motor.

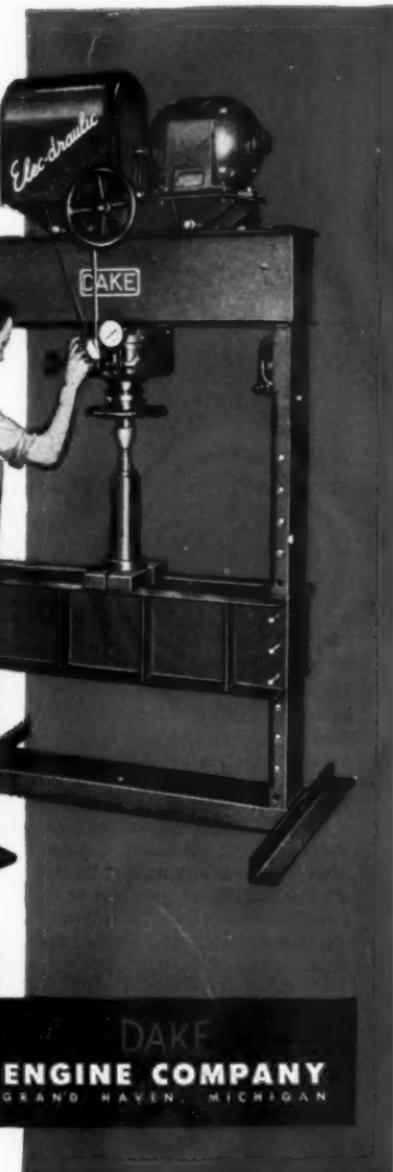
This press is ideal for production, assembling, and straightening operations, as well as general maintenance work. Pressures are set or released from simple controls at the front of the press. A gauge at eye level speeds operation, and a special safety valve prevents overload.

Like all Dake hydraulic presses, this one has a rigid frame and movable work head. It is available in either a 50- or 75-ton capacity.

For information about this or the smaller presses which make up the complete Dake line, mail the coupon below.

Dake Engine Company  
508 Seventh St., Grand Haven, Mich.  
Please mail me a copy of the latest Dake  
Arbor Press Catalog.

Name  This  
Company   
Address



DAKE  
ENGINE COMPANY  
GRAND HAVEN, MICHIGAN

# New VELSEY BLACK GRANITE STRAIGHT PLANE

FOR HIGH-SPOTTING  
LARGE AREAS



WITH an 8" x 36" face, the Straight Plane gives lateral as well as linear coverage for high-spotting surfaces to be ground or scraped.

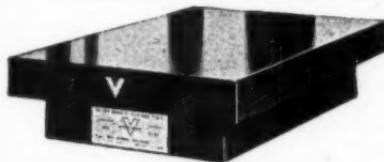
Suppose, for example, you are scraping a machine bed 12 feet long. You high-spot the middle section with the Straight Plane. After it is trued up, you lay about half of the Plane on the scraped surface and half on the adjoining area, working thus toward both ends of the bed. At the finish, you can have flatness over the whole area to a tolerance

of .0001" or less, both lengthwise and crosswise.

The bearing face of the Straight Plane has a flatness accuracy of .000025". No distortion can occur from molecular strain, temperature, or jarring. The Plane is non-corrosive, non-magnetic, impervious, impenetrable. Knocks do not cause burrs or bulges. Weight is approximately 200 pounds. Handles are removable.

The Straight Plane was designed at the suggestion of many metal-workers who have been using Velsey Surface Plates for high-spotting.

## VELSEY BLACK GRANITE SURFACE PLATES



BLACK GRANITE is the commercial name of Olivine Diabase, an igneous rock like basalt. It is nearly as hard as diamond; 15% heavier than granite; 1/30th as absorptive.

Due to the hardness and density of Olivine Diabase, Velsey Surface Plates last indefinitely with ordinary care. Master Series plates are finished to .00005" surface accuracy; Standard Series to .0001". In stock sizes: 12" x 18", 18" x 24", 24" x 36". Special sizes are made to order; as long and wide as wanted.

Ask for complete information about Velsey Straight Planes and Surface Plates.

**EAST SHORE MACH. PROD. CO.**

DEPT. 9, 835 E. 140TH ST.  
CLEVELAND 10, OHIO



**Simplified Control**

**Quick Set-up**

**Fast Operation**

**Stepless Speeds**

**Smooth Cutting**

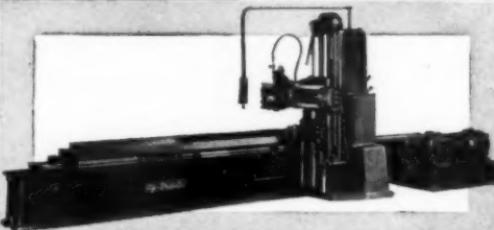
**Fast Reversals**

**Long Tool Life**

**Because It's  
HY-DRAULIC**

## **Rockford Hy-Draulic**

**Shaper-Planers**  
Built in five standard sizes with table stroke lengths ranging from 42" to 144". Shaper-Planers are equipped to your specifications with single or double cross rail head... and with side rail head.



6015

### **FASTER WORK on the "in-between" jobs . . . . .**

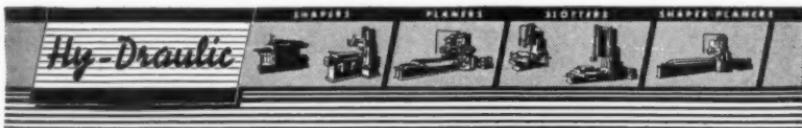
Because it's Hy-Draulic, the Rockford Shaper-Planer will give you faster work, on every type of shaper-planer job. The steel castings being machined above represent a typical application... work that is too small for standard planers, yet too large for shapers.

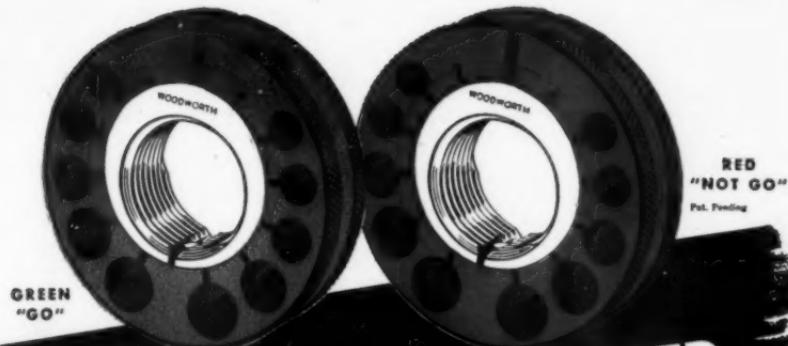
The reasons are many why Rockford Hy-Draulic Shaper-Planers hold "floor-to-floor" time to a minimum. Controls are centralized

and responsive, speeding up both set-up and actual machining time. Cutting strokes may be quickly set for any length and speed required within capacity limits... reversals are fast. To help decrease your overall machining costs, we suggest you get the facts on Rockford Hy-Draulic Shaper-Planers. Ask for Bulletin 445.

**ROCKFORD MACHINE TOOL CO.  
ROCKFORD**

**ILLINOIS**





# NEW TESTED-ACCEPTED THREAD RING GAGES

## 5-PLUS FEATURES

- 1 Greater accuracy and stability
- 2 Longer wear life
- 3 Less weight
- 4 Positive identification
- 5 Positive adjustment

ACCURACY YOU CAN TRUST

### WOODWORTH RING GAGES STILL PROVING "ON THE JOB" SUPREMACY OVER ORDINARY GAGES

No wonder more and more industries are adopting this gage as standard. Its revolutionary design assures wear life 5 to 7 times longer. And maintains accurate inspection.

This *proved* gage is easy to adjust, light in weight, durable—it's a *must* for cutting costs, increasing production. Just try the Woodworth Thread Ring Gage on your extra tough job—and you, too, will standardize!

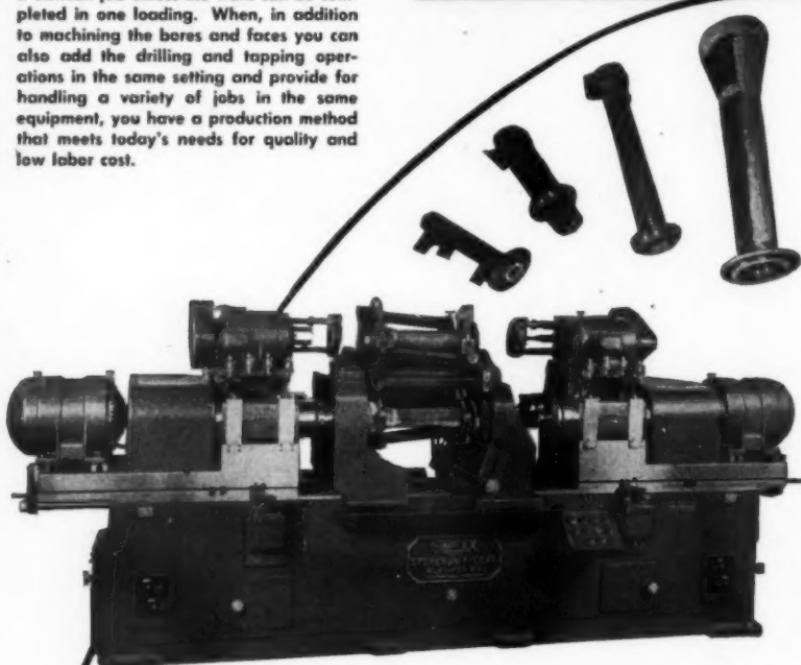
Wire or write for folder No. 46R  
at no obligation.

# WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION, 1300 E. NINE MILE ROAD • DETROIT 20, MICHIGAN  
PRECISION GAGES • PRECISION MACHINE PARTS • DIAPHRAGM CHUCKS • ADJUSTABLE CLAMPING JOBS • SPECIAL TOOLS

Machining tubular parts where the bores must be concentric, the faces parallel, is a difficult job unless the work can be completed in one loading. When, in addition to machining the bores and faces you can also add the drilling and tapping operations in the same setting and provide for handling a variety of jobs in the same equipment, you have a production method that meets today's needs for quality and low labor cost.

# SIMPLEX



The machine pictured is a SIMPLEX 4U 2-way Precision Boring Machine with four #4 spindles mounting combination boring and facing heads and also carrying unit type drilling heads with bushing plates for the drilling operation. By changing the fixtures, drills and boring tools, the various pieces illustrated can be handled with the same machine, thus this machine becomes in effect a production department in itself.

## Precision Boring Machines

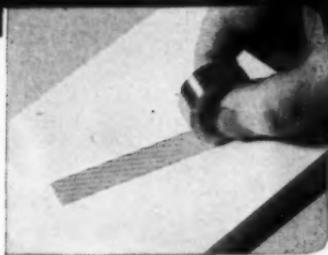
**STOKERUNIT CORPORATION**

SIMPLEX Machine Tools Division

4530 West Mitchell Street, Milwaukee 14, Wisconsin

Precision Boring Machines, Planer Type Milling Machines and Special Machine Tools

# Why Circular Chasers *Cut Costs*



1

## MORE CUTTING EDGE

Namco ground thread circular chasers may be reground through  $270^{\circ}$  of circumference—4 to 10 times more actual thread-cutting life than you can get with any other type of chaser.



2

## PRECISION SHARPENING

Chasers, mounted on blocks, are checked for precision on the Namco Micrometer Gauge. It tells you how much to grind off, and rechecks accuracy after grinding. Eliminates all chance of variation, and speeds up the regrounding operation. Saves production time by permitting settings to be made in the toolroom.



3

## FASTER REPLACEMENT

Lift handle to remove chasers—no screws to turn and no adjustments to make. You can keep a set of reground chasers ready and make the replacement in one minute, without disturbing the work. Then, the first piece turned is *production*—no cutting and trying necessary. Catalog D-42-C gives you all details.

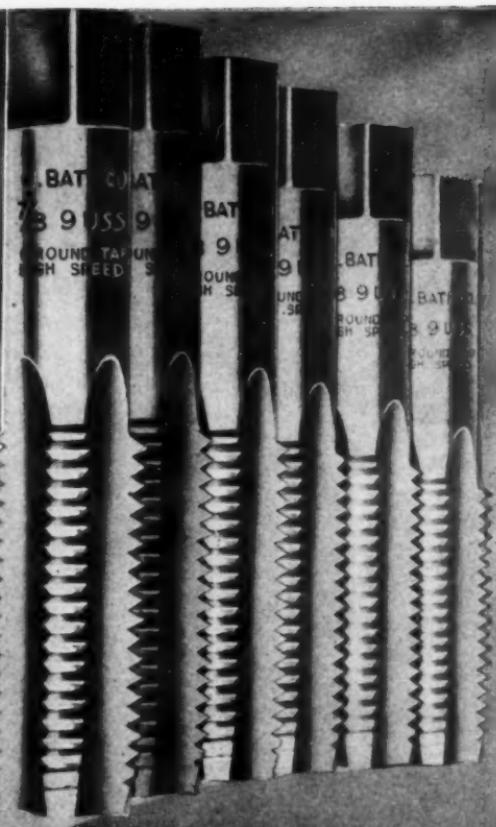
The NATIONAL ACME CO.

170 EAST 131<sup>st</sup> STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics;  
1-4-8 and 8 Spindles • Hydraulic Thread  
Rolling Machines • Automatic Threading Dies  
and Taps • The Chronolog • Limit, Motor Starter  
and Control Station Switches • Solenoids  
Gearing • Contract Manufacturing

# BATH TAPS

HARDENED  
TEMPERED  
TOUGHENED  
then  
Ground From  
THE SOLID



Cut threading costs with these superior built BATH taps. Recognized everywhere as the standard of quality . . . for this reason BATH taps lead in speedy, dependable production of accurate threads. Write today for further information and details as to what BATH taps can do for you.

*John Bath & Company, Inc.*

WORCESTER

MASS.

# Van Keuren

## MEASURING WIRES

STANDARD EQUIPMENT

Everywhere



Measuring the pitch diameter of a 1"-8 National Form thread gage with three wires. This method is recommended by the Bureau of Standards.



Set No. 20 Thread  
Measuring Wires

Van Keuren Measuring Wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, worms, splines and gears.

Reputable manufacturers of the ground taps and thread gages used for the production and acceptance of threaded holes and nuts use Van Keuren Measuring Wires. You will seldom find them in error if you, too, have Van Keuren Measuring Wires. Set No. 20 Thread Measuring Wires is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded male parts.

Price, High Speed Steel Wires..\$95.00

Price, Carboloy Wires.....\$240.00

Special wires from .002" to 1.510" diameter—prices on application.

It is easy to use Van Keuren wires. The Van Keuren handbook, "Precision Measuring Tools" gives complete tables and simplified formulas for measuring standard and special threads, splines, gears and worms. Send for this valuable 100-page handbook No. 33.



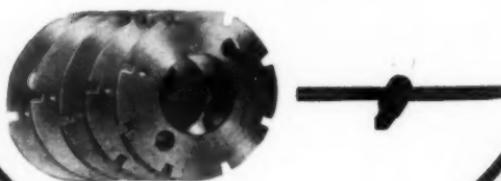
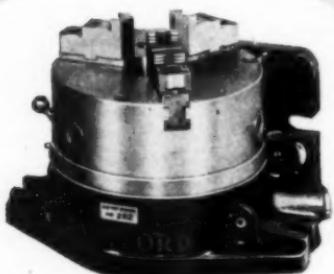
THE *Van Keuren*  
CO.,

28th YEAR

177 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wires • Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

# THE HARTFORD *Super Spacer*



UNEXCELLED ON ACCURATE  
INDEXING OPERATIONS

The Super Spacer is a tried and proven tool . . . readily adaptable for milling, drilling, grinding, jig boring and slotting. It is a versatile production aid of exceptional value

in accurate indexing operations . . . with feeds and speeds limited only by the capacity of the holding means and power of the machine.

Write today for full details.

*The Hartford*

SPECIAL MACHINERY CO.  
HARTFORD 5, CONN.



Photograph courtesy Precision Safety Chuck Company, Chicago, Ill.

# Step Taper Bore

COMPLETED IN  
ONE MINUTE

## USING SPECIAL DAVIS Boring Bar WITH ADJUSTABLE CUTTERS

Greater production and higher accuracy may be obtained in complicated boring operations by employing designed-for-the-job Davis boring bars and cutters.

In this application, taper bores of  $15^\circ$  and  $8\frac{1}{2}^\circ$  are made simultaneously by means of a special Davis boring bar with Davis adjustable high speed steel cutters.

### HOW TO INCREASE YOUR BORING PRODUCTION

Standard and special Davis boring tools make it possible to profitably combine boring, reaming, facing, counterboring, chamfering, recessing and similar operations on both horizontal and vertical machines.

#### Special Davis Tool

Another special Davis boring bar for bottom boring and counterboring precision chuck housing.

Competent Davis engineers are ready to work with you in selecting the most economical type of tooling that will assure the results you require.



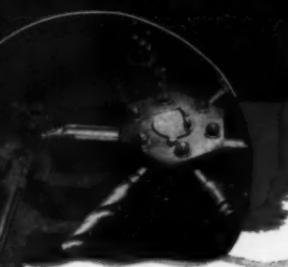
#### FREE DATA ON DAVIS STANDARD AND SPECIAL BORING TOOLS

Learn how Davis boring equipment can help solve your boring problems. Write today for Production Data Folder.



#### DAVIS BORING TOOL DIVISION OF

The Multi-Cutter Boring Tools that produce more at less cost



#### SEQUENCE of OPERATIONS

(Over-all Machining Time  
20 Minutes)

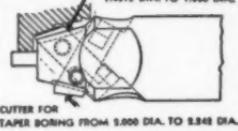
- 1-Drill  $1\frac{1}{2}''$  hole—from turret.
- 2-Bore  $15^\circ$  and  $8\frac{1}{2}^\circ$  taper with Davis tool—from turret.
- 3-Bore  $2\frac{1}{4}''$  diameter with fly cutter—from turret.

- 4-Chamfer, ream and face—from turret.
- 5-Drill  $2\frac{1}{4}''$  hole—from turret.

- 6-Face—from front cross slide.
- 7-Cut off—from rear cross slide.

#### DETAILS OF DAVIS BORING TOOL

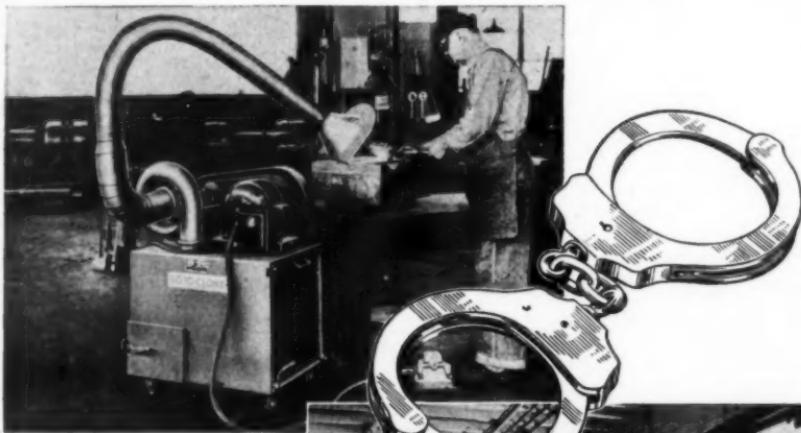
CUTTER FOR TAPER BORING FROM  
1.4375 DIA. TO 1.900 DIA.



CUTTER FOR  
TAPER BORING FROM 2.000 DIA. TO 2.542 DIA.



# Handcuff dust at its source



**DUST** on the loose breeds trouble. Workmen, machinery, plant and product — all are handicapped where process dust is not controlled.

The Roto-Clone system of dust control picks up dust-laden air at its source, separates the dust, delivers the collected material to storage hopper or disposal point and expels the clean air all in a single operation — with one moving part. It's compact, requiring minimum space — costs less to install because location at or near source of dust eliminates long pipe lines and expensive outdoor dust collectors.

Roto-Clones are available in a size and type to handle dust separation efficiently over a wide range of particle sizes and specific gravities. There's an experienced American Air Filter representative in your area. He has seen



many dust problems that were "different"—and solved them with Roto-Clones. Write today for complete information.

**American Air Filter Company, Inc.**, 312 CENTRAL AVE., LOUISVILLE 8, KY.

*In Canada: Darling Bros., Ltd., Montreal, P. Q.*



ROTO-CLONE  
DUST CONTROL

CUT AWAY EXCESS METAL...

FASTER

with

*Thor*

**PNEUMATIC  
GRINDERS  
AND SANDERS**

Plenty of power and speed—teamed with smooth, dependable operation—gets more work done in less time—with top accuracy. Thor Grinders and Sanders handle all types of metal removal with maximum economy. Full range of sizes—in speeds from 3,000 to 20,000 r.p.m.

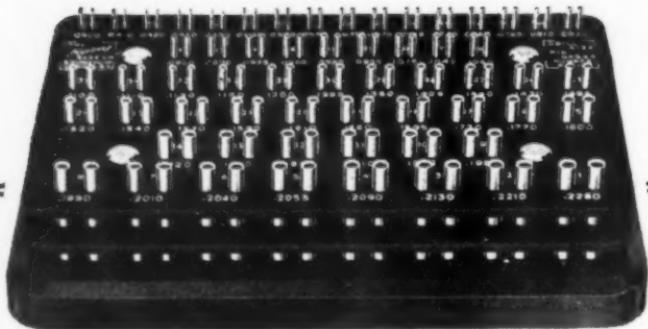
*Call your nearby Thor branch for a demonstration.*

**INDEPENDENT PNEUMATIC TOOL COMPANY**  
600 W. Jackson Boulevard, Chicago 6, Illinois

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*Thor*  
**PORTABLE POWER**  
**TOOLS**

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## **DRILL SIZE PIN GAGES**

## Class Z Accuracy

LETTER SET—52 gages  
in 26 pairs from A to Z.  
\$45 set.

**FRACTION SET—60**  
gages in 30 pairs in  
steps of  $1/64"$  from  
 $3/64"$  to  $1\frac{1}{2}"$ , \$50 set.

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gages in 60 pairs from  
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All sets include stands  
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any  
size



Sets in pairs of gages for checking any number of similar holes. Stands have 3 plates and cover so that gages stand upright. Drill size is plainly stamped in front of each gage hole, together with decimal equivalent to the ten thousandths of an inch.

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# THE Horberg GAGE COMPANY

19 STAPLES STREET, BRIDGEPORT, CONN.

# If you visit the Wico Electric plant



they will probably point out this machine



This progressive manufacturer, ever alert to increasing manufacturing efficiency, sought a better way to machine a rather large and "difficult" magneto housing. There are three different materials in the piece — aluminum die casting, steel bushing and liner, and brass spacer. The tapered hole in the bushing requires a fine finish and close tolerance. The inside diameter of the liners must also be closely maintained.

The housing was formerly turned out on four turret lathes at the rate of 28.8 per hour. New Britain engineers proposed replacing these four lathes with a single Model 695 New Britain Chucking Machine. Here are the results:

Regular production rate over a six-month period — 102 pieces per hour. Uniformity and

over-all quality substantially improved. Cost per piece reduced from 55¢ to 12.8¢. Operator fatigue practically eliminated. Wico management reports that the new machine will pay for itself in less than two years, and completely meets every requirement on this "difficult" piece.

Since the earliest days of automatic machines, the ability of New Britains to reduce production costs and provide a foundation for increased employment has been an important factor in the growth of American manufacturing. This ability, as well as the range of work New Britain Automatics can perform, is constantly being expanded by New Britain engineering and research. Why not check over your work with the New Britain sales engineer in your locality?

## ENGINEERING DETAILS

Fourteen tools are fed in by the main tool slide, and the fact that three different metals are cut at the same time makes the production rate outstanding. To produce the fine finish and close tolerance of the taper bushing hole, two boring, one counter-boring and two taperreaming operations are performed. Two roughing cuts and one finish operation are employed to assure high uniformity and good finish in machining the segment inserts.

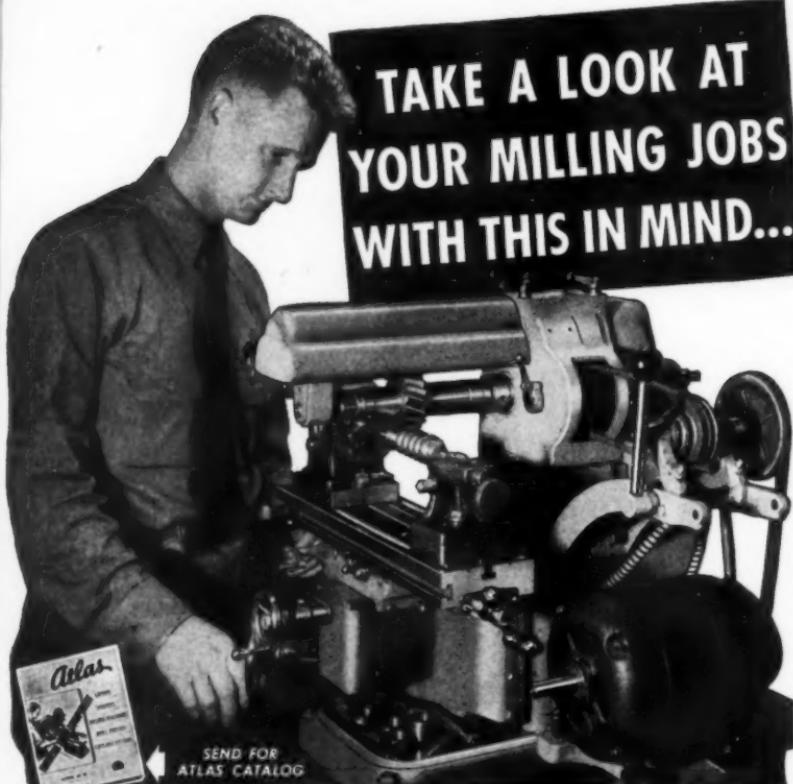


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KEY TO MORE SALES AND  
FULL EMPLOYMENT

# New Britain

THE NEW BRITAIN MACHINE COMPANY  
NEW BRITAIN-GRIDLEY MACHINE DIVISION  
NEW BRITAIN, CONNECTICUT

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YOUR MILLING JOBS  
WITH THIS IN MIND...



**M**illing costs can be cut—despite higher labor rates. Use your big machine for big work. Install Atlas millers to take over all small parts production. You save set-up time, save power, save tremendously on equipment cost.

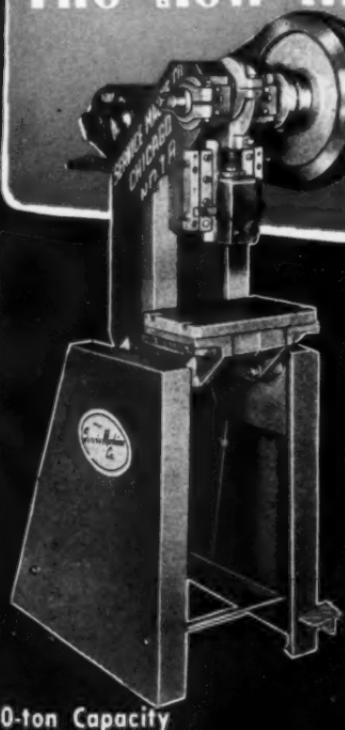
An Atlas performs all standard milling operations to close tolerances . . . at production tempo. Table is  $4\frac{1}{2}''$  x  $18''$ —travels 10" longitudinally, 6" vertically,  $3\frac{1}{2}''$  cross-table. Spindle speeds from 62 to 2870 RPM provide correct range for all types of work and cutters. Back-gearred power, complete V-belt drive, Timken bearings. Operates from  $\frac{1}{3}$  HP motor. Three control mechanisms—manual, lever, Change-O-Matic available now for prompt delivery through Atlas distributors. Send for complete information.

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Relief*

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skill.



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**D-S** is all-purpose equipment  
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625 E. 4th ST. ROYAL OAK, MICH.





Here is a close-up showing how the main tool slide stroke is set by an adjustable dog on the worm wheel.

**EASY TO GET AT.** Main tool slide setting on the GREENLEE "6" is unique in its simplicity, accuracy, and speed of adjustment. Instead of the conventional barrel cam or similar arrangement, the GREENLEE has a worm and worm wheel drive to a special rack and pinion mechanism. The length of the feed stroke is controlled by a single adjustable dog on the worm wheel. By simply removing a cover plate and resetting this dog on a graduated scale . . . the work of only a few minutes . . . the point where cutting feed starts can be quickly and accurately set. This important GREENLEE feature goes a long way to reduce set-up time between jobs. Many other distinctive features make the GREENLEE "6" the Operator's Favorite.



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February, 1947

MACHINE TOOL BLUE BOOK



**WRITE TODAY  
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MANCHESTER • CONNECTICUT

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WRENCH**

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*don't  
gamble  
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Eliminate product failures and rejects caused by warping, stripping or under-tightening of screws, bolts and threaded parts. Insure the complete performance of your products by speedy assembly with Sturtevant Sensory Torque Wrenches.

For faster than other production Torque Wrenches (because operation is by automatic reflex-action), Sensory Wrenches are infallibly accurate, for accuracy too is automatic.

World's largest manufacturer of Torque Wrenches—31 capacities.

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PA **Sturtevant Co.**  
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*Axial Relief*

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**Ideal  
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Cutting  
Chamfers  
on  
TAPS**

**H**ERE'S a fixture that will save you the expense of buying special duty machines for such work as grinding cutting edges, steps, flutes and chip relief on milling cutters, burring tools, counterbores, countersinks, end mills, reamers, drills and taps.

All adjustments simple, visual and external. Instantly adjusted to right or left hand. Axial relief automatically equalized on all flutes. Can be used on surface grinders as well as cutter grinders. Performs most jobs with standard grinding wheels.

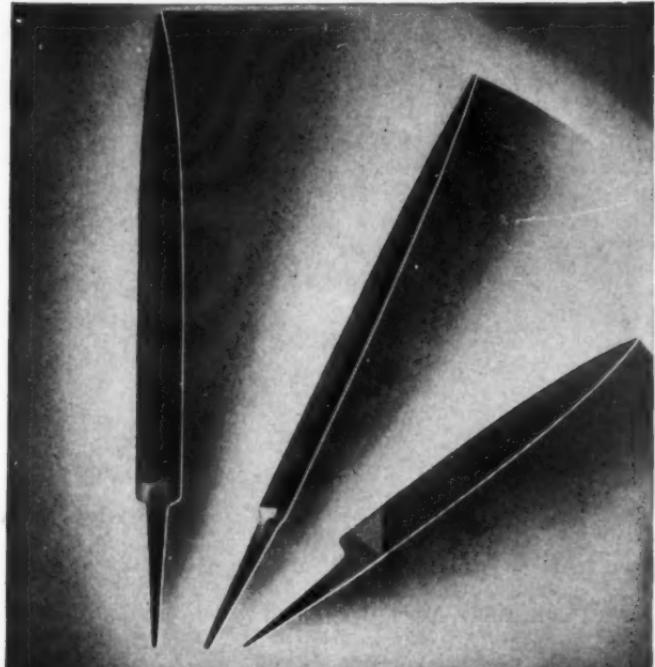
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**Enco HEXTURRET**  
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It's an ideal replacement unit that restores the original precision of a valuable machine . . . and prolongs its life and utility—profitably—at a very moderate investment.

An Enco HEXTURRET provides the speed, rigidity and accuracy that steps up output—and cuts production costs—invaluable aids in today's fight to maintain profit margins.

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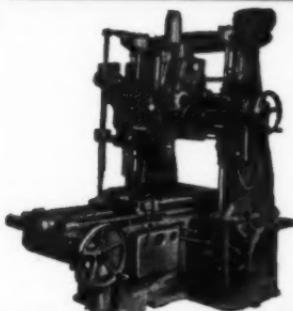


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Tool Posts**

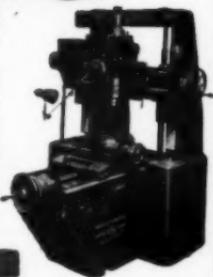
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Above: SIP No. 4G Jig Borer. Table size,  $27\frac{1}{2}''$  x  $22\frac{1}{2}''$ . Direct readings to  $0.00005''$ . Right: SIP No. 3K Jig Borer with table  $21\frac{1}{2}''$  x  $16''$ . Direct readings to  $0.00005''$ . Below: No. 2H incorporates same optical measuring system as Hydroptic-B. Settings are guaranteed accurate to  $0.00015''$ . Table size,  $27\frac{1}{2}''$  x  $12\frac{1}{2}''$ .



Above: SIP Hydroptic-B Jig Boring and Milling Machine. Table size,  $38\frac{1}{2}''$  x  $32''$ . Accuracy for settings of worktable and spindle head is guaranteed to  $0.0002''$ . Optical measuring system makes the Hydroptic-B also a measuring instrument of unquestioned accuracy.



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American manufacturers who must have the ultimate in precision machining may now obtain all the advantages of famed Swiss workmanship by selecting SIP Jig Borers. Exceptional precision, sturdiness of construction and time-saving features of set-up and operation insure dependable operation over a wide range of work. The Hydroptic-B Jig Boring and Milling Machine (illustrated above) is equipped with a built-in optical measuring system which is completely protected and entirely free from mechanical stress. This advantageous feature has also been employed in the smaller SIP Jig Borer No. 2H (bottom illustration). Each of the complete line of SIP Jig Borers is capable of producing work of exceptional precision, and each is so dependable in operation that it is not only a metal-working machine, but also a measuring instrument of unquestioned accuracy. We represent in the United States the following Swiss manufacturers: Societe Genevoise d'Instruments de Physique (SIP), Andre Bachtler, Mikron, Safag, Studer, Sallaz, Schaublin, Lienhard. With these lines to choose from, we can give expert advice in selecting the correct Swiss Machine Tools and Measuring Instruments for every job.

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HIGH PRECISION MACHINE TOOLS AND MEASURING INSTRUMENTS



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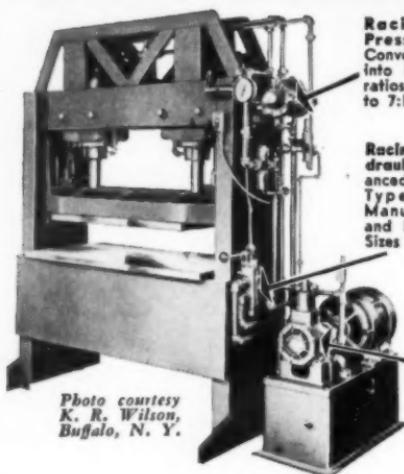


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K. R. Wilson,  
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**Racine Hydraulic Pressure Booster** — Converts low pressures into high pressures in ratios ranging from 3:1 to 7:1.



**Racine Four-Way Hydraulic Valve** — Balanced Piston — Sleeve Type construction. Manual, Mechanical and Electrical control. Sizes  $\frac{3}{8}$ " to  $1\frac{1}{2}$ ".



**Racine Variable Volume Oil Hydraulic Pump** — 12 to 30 G. P.M. Pressure 50 to 1000 lbs. p.s.i.



## INTEGRATED TO YOUR DESIGN . . . centralized or remote control

Like this press manufacturer, you can readily give your products the advantage of a RACINE "Variable Volume", hydraulic circuit. This feature saves horsepower and reduces heat by simplifying the installation and eliminating unnecessary relief and bypass valves. Important savings in first cost also result.

RACINE Hydraulic Engineers have developed hydraulic operation and control for hundreds of machines and tools. Their experience can be helpful in applying "RACINE Hydraulics" to your present product and on new designs now in the development stage. They will cheerfully review your problems in power movement, without cost or obligation.

Let us submit detailed recommendations and circuits employing pressures as high as 3000 lbs. p.s.i. Utilize the Variable Volume feature of RACINE Pumps and easy operating, long-lived RACINE sleeve-type valves. Ask for RACINE catalog P-10-C today. RACINE TOOL AND MACHINE COMPANY, 1754 State Street, Racine, Wisconsin.



# RACINE

STANDARD FOR QUALITY AND PRECISION



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A MACHINE IS  
AS GOOD AS ITS  
CUTTING TOOL...

*Specify*  
**CONTINENTAL**

The precision cutting tool must be even more accurate than the machine, the fixture, or the finished part. "Continental" cutting tools made by Ex-Cell-O (they run from a standard counterbore to all types of broaches and to special carbide-tipped tools of intricate design) are acknowledged to be among the best obtainable in design and manufacture and in actual production results.

**CONTINENTAL TOOL WORKS**  
DIVISION OF EX-CELL-O CORPORATION  
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# THE Knurling SAVES TIME EVEN WITH OILY, GREASY HANDS

REG. U.S. PAT. OFF.

UNBRAKO

The "Unbrako" Socket Head Cap Screw is a time-saver because the knurled head provides a slip- and fumble-proof grip—even for the oiliest and greasiest fingers. It can, therefore, be screwed-in faster and farther before it becomes necessary to use a wrench—assures a more compact, neater fastening with decided savings in material, space and cost.

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PAT'D &  
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Knurling of Socket  
Screws originated with  
"Unbrako" in 1934.

You can't screw socket  
screws in or out without a  
hex socket wrench—so why  
not get our No. 25 or No. 50

"Hollowell"®  
Hollow Handle Key Kit  
which contains most all  
hex bits.

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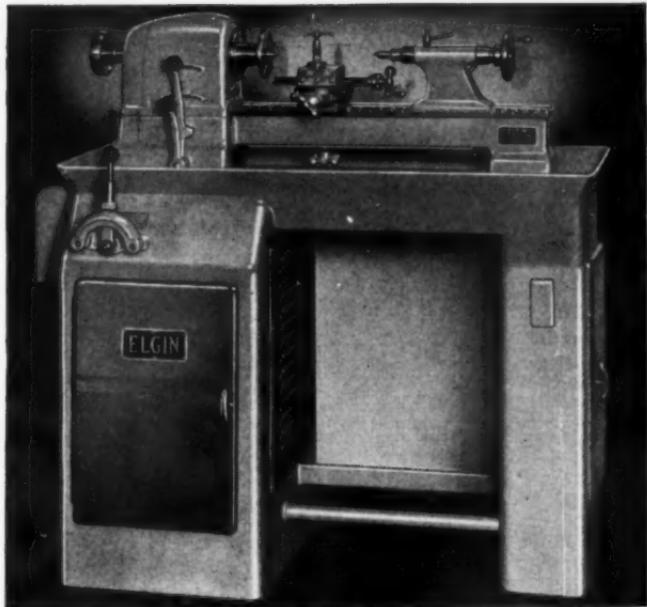
OVER 43 YEARS IN BUSINESS



"Unbrako" and "Hollowell" products are  
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- The "Elgin Line" now is furnished with knee-hole bases with foot rests, permitting operator to sit comfortably, close-up and directly in front of work.
- Motor is mounted in base with direct cross ventilation.
- Three shelves are provided on right hand side.
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- Variable speed drive provides stepless spindle speeds from 40 to 4000 rpm.

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# ELGIN TOOL WORKS

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## ELECTRIC HEAT TREATING FURNACES

### WITH AUTOMATIC HEAT CONTROL

#### SPECIFICATIONS

- Interior size—Model 7051— $5\frac{1}{2}'' \times 5\frac{1}{2}'' \times 6''$
- Exterior size— $15'' \times 15'' \times 17''$
- Operation—115 V. A.C. only
- Rating—1.2 K. W.
- Ship. Wt.—Approx. 85 lbs.
- Operating cost—Approx. 3¢ per hr.

PRICE \$112.00 f.o.b. Factory, Philadelphia

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- Rating—3 K.W.
- Ship. Wt.—Approx. 225 lbs.
- Operating cost—Approx. 6 to 8¢ per hr.

PRICE \$188.00 f.o.b. Factory, Philadelphia

Just what you have been waiting for. Electric heat treating furnaces that are easily operated; you can do your own heat treating — harden and temper dies, punches, gauges, jig and fixture parts, normalize weldings and castings. It's easy with a "LUCIFER" because it has the "LUCIFER" automatic electric heat control that permits stepless control of any predetermined heat within its range up to 2000° F. All "LUCIFER" furnaces are equipped with indicating built in pyrometers calibrated both in Fahrenheit and Centigrade, pilot light, control switches and automatic control devices. You can now equip your old Furnace with a Lucifer Automatic Heat Control unit 115 or 230 V. A.C. up to 5 K.W., from \$27.50 to \$41.50 complete. We can also supply a 7 day Control, which will turn your furnace on in the morning and off at night, shut off at noon Saturday, skip Sunday and repeat each 7 days. \$27.50 complete. All prices are F.O.B. factory Philadelphia, Pa.

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Used by practically every automobile, truck, tractor, diesel engine manufacturer and others with studs to set in quantity.



As the action of the tool is positive and automatic, it can be operated in any position with either air or electrically operated portable tools. It can also be used in a drill press, where it is possible to drill and tap the holes and set the studs in successive operations.

Write for detailed information on the Modern Stud Setter. You will be interested in how and why it provides a proved means for stepping up your production.

**MODERN TOOL WORKS**  
DIVISION OF  
CONSOLIDATED MACHINE TOOL CORPORATION  
ROCHESTER 10, NEW YORK

Tool brought to position over stud, about to begin drive.



Start of the drive, with tool engaged on the stud.



The three simple MODERN steps to speed, economy, and convenience in stud setting are illustrated at the right.

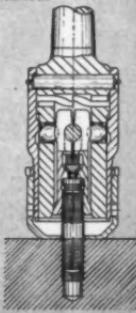
At the top . . . jaws open to take the stud.

Middle . . . driving position, jaws locked on stud.

At the bottom . . . stud driven to full depth. The stop collar contacts the work and releases the clutch. Lifting the tool opens the jaws.

The tool revolves in one direction, no reversal, for the complete job.

Drive completed, with clutch released.



# 40

# YEARS of EXPERIENCE

*produced*  
the new **COULTER**  
**AUTOMATIC THREADING LATHE**



The many different and number of threading tools which can be arranged on the tool slides both front and rear, make this machine the most versatile of any for production of square, standard, and 29 degree threads, both internal and external.

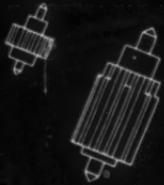
Equipped with disc clutch . . . Easy to operate . . . Rigid Construction . . . Four speed headstock . . . Return or Idle travel speed has been increased five times cutting speed.

PRODUCTION MACHINES  
SINCE 1896

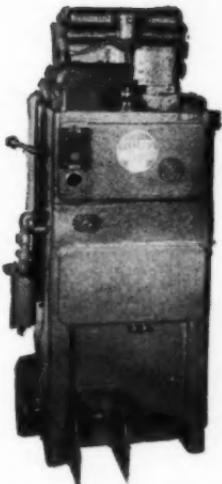
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*The James* **COULTER** *Machine Co.*  
BRIDGEPORT • CONNECTICUT • U. S. A.

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## for Small Fine-Pitch Gear Production



Fellows 3-inch Fine-Pitch  
Gear Shaper

High-involute accuracy in gears and pinions as fine as 200 pitch, and with high-speed production up to 3 inches diameter and  $\frac{3}{4}$ -inch face width...that is the range of the Fellows No. 3 Fine-Pitch Gear Shaper.

Extra precision and quieter operation are the standout selling features of gears cut on this machine. Typical Fellows versatility places this Gear Shaper in a class by itself. A descriptive circular is yours for the asking.

# Fellows

THE FELLOWS GEAR SHAPER CO., Head Office and Export Dept., Springfield, Vermont,  
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# EXTRA WEIGHT-SPEED-CAPACITY IN THIS MODERN-DESIGNED CUT-OFF TOOL

ONE LOOK at the Johnson Band Saw tells you that it is designed on up-to-the-minute machine tool lines —

For instance, the THREE POINT SUPPORT — three heavy, box section legs which make the most uneven floor as level as a toolmaker's surface plate. Wide span at rear gives full stability — single leg at front is out of operator's way. The BROAD, DEEP BED, immune to distortion. The QUICK-ACTING VISE, instantly adjusted to the job without reaching. The BOLT-ACTION STOCK STOP for duplicate lengths.

Note too, the HEAVY, STIFF BOX-SECTION GUARD and running gear sup-

port. The LARGE, 16" BAND WHEELS which allow extra capacity with little twist of saw blade. The GENEROUS CAPACITY — 10" HIGH, 18" WIDE — enough for almost any cut-off job, on any shape work. The HYDRAULIC FEED CONTROL which, with the quick-adjustable slide weight, maintains correct blade pressure. The EXTRA THIN BLADE — .032" — which removes less stock, and does it faster and more accurately.

These are just a few of many exceptional features that are everywhere proving the profit-making qualities of this machine.

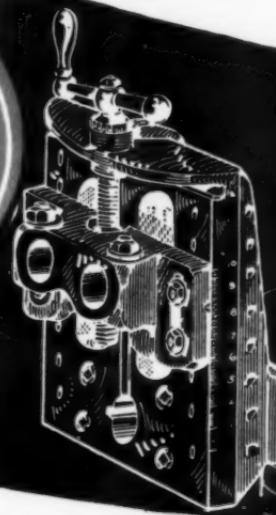
## *The* JOHNSON METAL CUT-OFF BAND SAW



Wet cutting attachment available—also  
casters for quick portability. Complete  
details in catalog just off the press.  
Write.

# JOHNSON

MANUFACTURING CORP.  
616 CHRYSLER BLDG.,  
NEW YORK 17, N. Y.



This holder is especially designed and adapted for use with models 4D and 4DE machines only. There are many other Potter & Johnston tools that would be helpful in cutting production costs to meet post-war competition.

## STANDARD ADJUSTABLE TURNING TOOL HOLDER

This adjustable tool holder will carry two Stems, either for turning or boring cuts, and in addition, a boring bar or drill may be carried in the center hole. The cutters are quickly set to the required diameters by moving the adjustable block up or down. The side scale and the micrometer dial under the ball crank contribute to quick and accurate settings which may be changed easily with the job. Two locking screws on either side of the block fix it solidly in the location desired. The adjustment range of the Stem holes is from 4 to 10" from the rotation center.

If you use Potter & Johnston machines in your plant, it will pay you to let us send you a copy of this catalog on modern tooling. It illustrates and describes a broad range of up-to-the-minute production tools.



*The* **POTTER & JOHNSTON**  
**MACHINE CO.** PAWTUCKET, RHODE ISLAND



Do your men  
get  
**3 O'Clock**  
**Fatigue**



## THE CN-2 ABRASIVE BELT GRINDER

Comprising Resilient Contact  
Wheel—Idler—Abrasive Belt—Platen  
—Driving Pulley and Arbor—Motor  
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# Featured In This Issue

**MODERN CENTERLESS GRINDING PRACTICE**, by D. E. Lower, is the first of a four part article dealing with centerless grinding methods. In this installment the author describes some of the advantages of the method and describes some of the jobs performed. Of particular interest is Mr. Lower's analysis of the grinding of fuel injection plungers for bombers. Limits on this job were plus or minus .000005". Page ..... 135

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**AIRLESS BLASTING BREAKS BOTTLE-NECKS**, by Carl Zinnow, discusses in detail some of the fundamentals of airless blasting. The increased production and lowered manufacturing costs resulting from a utilization of this modern cleaning method is described. Page ..... 151

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**CLEANING COOLANTS**, by Ned Bailey. Here is an analysis of the flotation method used at the McGill Manufacturing Co. to keep coolants constantly clean. The article stresses the dangers of dirty coolants and emphasizes the need for overcoming the danger. The method used at the McGill Co. is described, the benefits accruing to the company are enumerated. Page ..... 182

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**HANDLING, PROCESSING CHIPS AND SCRAP**, by John E. Hyler. The author describes the various methods used to remove chips and scraps from machines. Lift trucks, conveyors, magnets and other loading equipment is mentioned. Necessity of completely removing all oil from chips is strongly stressed. Briquetting is briefly touched upon. Page ..... 202

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**RADIO FREQUENCY HEATING**, by B. E. Rector. In clear, simple language this Westinghouse engineer describes the fundamentals of induction and dielectric heating. The kinds of operations which can be performed with dielectric and induction heating are illustrated by actual examples of work. Page ..... 228

**PRECISION MEASUREMENT**, by Warren Baker. Part 8 of this popular series discusses the inspection of height gages and solid squares. The method used to determine perpendicularity of height gages is explained in authoritative detail. Page ..... 241

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**METAL STAMPING OPERATIONS**, by D. A. Rogers. The author discusses the drawing of round shells without flange. The factors which govern the possible height of single operation drawing of a shell are analyzed. Charts and tables provide valuable data. Page ..... 257

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**FOREMANSHIP FORUM**, by Ed. Mottershead. Management's job to make foremen feel a part of management is given a thorough airing. The thinking is down to earth. Page ..... 269

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**PRODUCTION OF ACCURATE EMBOSsing DIES**, by Carl O. Malmstrom describes the advantages to be gained from using the pantograph and metal spraying method of making embossing dies. The equipment needed is mentioned. Cost and time advantages are stressed. Page ..... 276

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# VERSATILE...

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# *As The Editor Sees It*

## THE BUSINESSMAN AND WORLD PROSPERITY

Highlight of the recent Institute on World Affairs, held at Cleveland by the Cleveland Council on World Affairs, directed by Dr. Brooks Emeny, and co-sponsored by TIME magazine, was a speech by the former Secretary of State, Mr. Byrnes. From his vantage point in Europe, Mr. Byrnes saw the necessity for strong and immediate economic intervention in Europe. The urgent need of intervention and the American responsibility, from the standpoint of enlightened self-interest, for supplying the desperately desired production equipment and credits to war-shattered countries, comprised a portion of his address.

To the credit of the American businessmen let it be said that they thoroughly endorse Mr. Byrnes' views, in principle, and climb to the stump at every opportunity to pound home to the general public that only an economically prosperous Europe can assure world wide prosperity . . . that only American credit, engineers and equipment can bring about political and economic stabilization which is a first guarantee of world peace. Unfortunately, we have seen only rose-colored words, lip service and little shipment of equipment to Europe in any amounts approximating the desperate need.

Discernable here is the businessmens' typical attitude that everything will right itself somehow, as long as they give adequate moral support. Unfortunately, moral support does not rebuild factories, produce raw materials, credits, and certainly will not supply current for machine tools. Dead machines and idle hands breed bankruptcy and trouble; to think that world prosperity is achieved in a bankrupt and troubled world is a childish dream. We have twice, in 1917 and in 1941, paid for the pleasure of playing ostrich to a sick world; the time has come for sterner games. War in Europe means war in America, depression over there is depression here; only firm and unselfish American leadership now will avert a repeat performance of 1917 or 1941.

American business cannot sit idly by while the economic futures of European nations is shaped by interests antagonistic to the American way of life. Business must take steps to furnish Europe with the tools of production. Not only is this good business, but only healthy nations can contribute to the prosperity and the peace of the world.

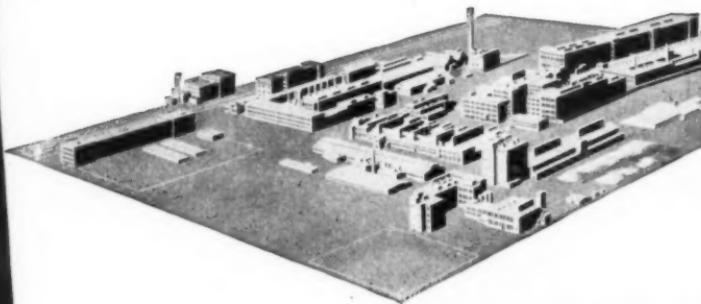
*William F. Schleicher*

Editor-in-Chief

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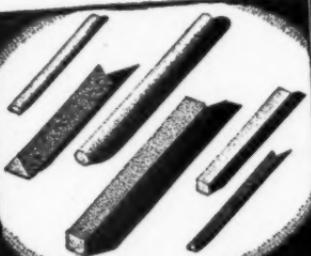
# MANUFACTURING RESOURCES



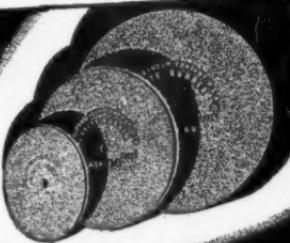
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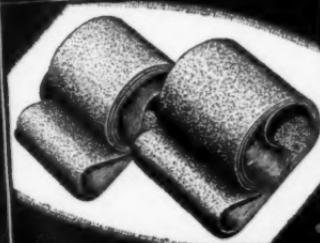
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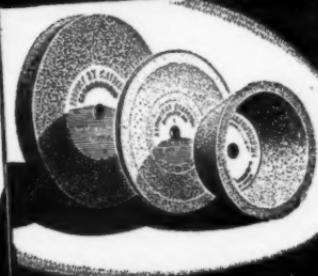
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# RYERSON STEEL

# MODERN CENTERLESS GRINDING PRACTICE



Part 1  
Fundamentals, Advantages  
and Applications  
of Centerless Grinding.

By D. E. Lower,  
Abrasive Engineer,  
Simonds Abrasive  
Company

On some parts the centerless grinding method has always had certain advantages over cylindrical grinding between centers.

1. Long, slender pieces like the textile spindle in Fig. 1, cannot be ground accurately between centers because they would be distorted by the axial pressures of the centers and the radial pressure of the grinding wheel. In centerless grinding there is no axial pressure by the centers. Pressure of the grinding wheel does not cause distortion because the work-piece is supported rigidly directly under the cut by the regulation wheel and the work support blade.

When grinding between centers, it is necessary to keep the pressure of the

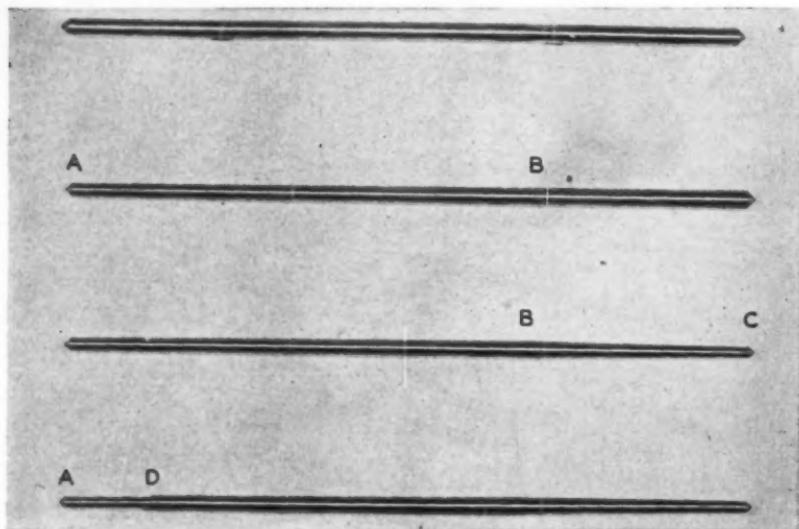
wheel comparatively low, because even pieces of relatively short length and large diameter are likely to be distorted by the grinding wheel if strong pressure is applied for heavy material removal. In centerless grinding, fear of distortion need not limit wheel pressure; consequently, metal can be removed more rapidly.

In centerless grinding those common causes of grinding troubles, worn or dirty center points and holes, are eliminated.

2. Less material need be left for grinding, since errors in centering are eliminated; at the same time the centerless method tends to grind the largest possible diameter from the stock. This saves both material and grinding time.

• • •

**Fig. 1. This long, slender textile spindle would, at best, be difficult to grind accurately between centers. The four operations by centerless grinding on a Landis machine are: (1) grinding the spindle straight and round, (2) grinding the long taper on the spindle from A to B, (3) grinding the short taper on the spindle from B to C, (4) grinding the shoulder on the spindle from A to B.**



HARDENED STEEL  
 FINISH REQUIRED 10 MICRO  
 STOCK REMOVED .015-.025  
 (PER CUT .005) ROUGH  
 .001 FINISH  
 5 CUTS

ROUNDNESS AND  
 STRAIGHTNESS  
 .0002 FINISH  
 SIDES SQUARE WITH O.D. .0005  
 3800 PER HR. PER CUT (ROUGH)  
 3800 PER HR. PER CUT (FINISH)

THRU FEED GRIND

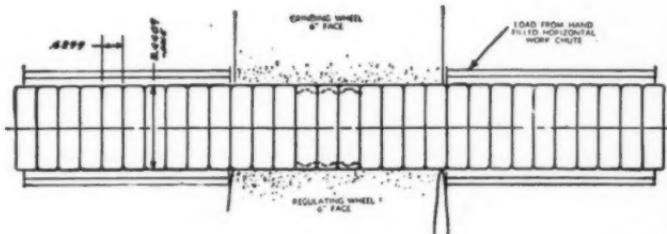


Fig. 2. These outer bearing races are loaded into a Landis machine while previously loaded races are ground by the thru feed method to .0002" for roundness and straightness, and with O.D. square with sides to .0005". Production for both rough and finish is 3800 per hour.

3. Errors in setting up and in compensating for wheel wear are 50 per cent less by the centerless method than by between-center grinding, since material removal is measured on the diameter rather than on the radius.

4. In between-center grinding, each piece must be set up. Center holes must be drilled and sometimes lapped, and each piece of work must be dogged. In centerless grinding only one set-up operation is required for the entire lot when the two wheels and work support blade are brought into the required relationship; as a result, set-up time per piece is negligible. Also, much less time is required for adjustments and gaging.

5. Many small parts, Fig. 2, provided their shapes permit, can practically be ground automatically by using magazine, hopper, or gravity chute loading

devices and by unloading them by gravity or ejectors. Even when pieces are loaded by hand, the loading can usually be done while a piece is being ground, thus making the operation continuous.

Tolerances of .0001" or even .00005" are common in production centerless grinding. Piston pins are an example. Bearing races 1 1/8" O.D. have been ground at the rate of 684 per hour to limits of 4 to 8 hundred-thousandths for size and with surface quality of 4 to 5 micro-inches.

Parts that are badly out of balance lengthwise, Fig. 3, which consists of four different diameters each of short length compared to the diameters—have been ground on the large diameter by thrufeed to limits for size of  $\pm .00025"$ , and round and straight within .0002".

Fig. 3. Top Right. Although this axle support pin is badly out of balance lengthwise, 350 pieces per hour are centerless ground on a Landis machine in a single pass to  $.8745"-.8750"$  for size and within  $.0002"$  for roundness and straightness.

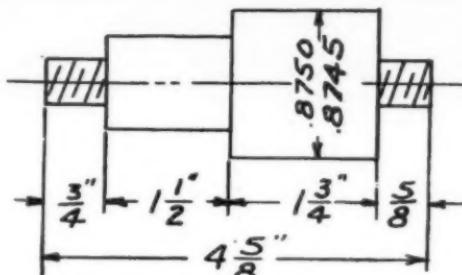


Fig. 4. Bottom Right. The government demanded that these fuel injection plungers for B29's be ground to limits of  $\pm .000005"$ . A specially re-designed Cincinnati centerless lapping machine turned them out in quantity to  $\pm .0000035"$ . No selective assembly or fitting needed.



An example of wartime developments in accurate centerless grinding is the grinding of fuel injection plungers for bombers. The government specified limits of  $\pm .000005"$ , which had formerly been approached only by gage makers—and not on a high production basis. Ordinarily such close limits on machine parts would have been achieved by selective assembly which would allow the pieces to vary by a total of around  $.0015"$ .

But selective assembly could not be permitted for these plungers because of the excessive inspection time required and because of maintenance and repair trouble sure to develop in the field, and yet, no existing grinder, center type or centerless, could approach such limits without selective assembly. The only possibility was to develop a much more accurate machine.

The Cincinnati centerless lapping machine had produced piston pins of great accuracy, and it was decided to start with it. To enable this lapping machine to do the job it was practically redesigned in everything but the underlying principle. Bearings, drivers and drives were changed. A thermal control device was installed to maintain constant coolant temperature, for a change in temperature of the part as slight as that caused by the heat from an inspector's hand could make the work change size to more than the allowable limits.

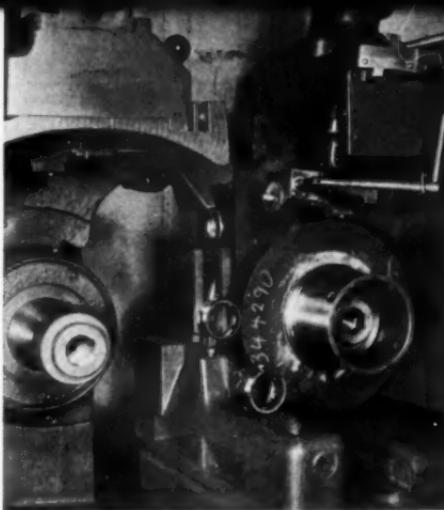
The grinding was done in sixteen passes to remove a total of  $.000525"$  of stock. The diameter reduction was about  $.000080"$  on the first pass, about  $.000010$  on the last pass. Limits were held rigidly to  $\pm .0000035"$  for size and to  $.000005"$  for straightness and roundness. Surface quality was kept to less than 2 micro-inches. Both were less than the government had specified. At the

Fig. 5. Cincinnati centerless machine arranged for grinding spherical outside diameter of bearing cages. Both the grinding and regulating wheels are dressed to a radius and the cage is located from the back face against the backing plate. A slight feed angle holds the cage against the plate.

• • •

feed rate of  $43\frac{1}{2}$ " per minute, 600 plungers could have been produced per hour, although that output was not often needed.

While not universally applicable for all cylindrical parts that can be ground between centers, centerless grinding has wide application. One shop grinds on a Lidköping machine, 10" lengths of wire, .01" O. D., which obviously could not be ground between centers. Using a larger size of the same machine, another shop grinds shafts 6" O. D. x 25' long and tubes of the same length up to 12" O. D. One of the largest pieces centerless ground are bearing races 30" O. D. Clock balance staffs, Fig. 6, are ground by the infeed method, and held to between .196" and .199" for length and between .0345" and .035" O. D. They



are ground in large quantities using loading magazines to get practically continuous production.

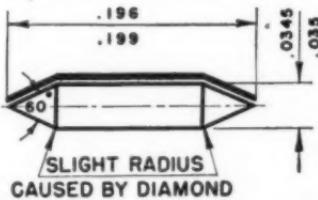
Crank shafts are centerless ground from the rough on special, heavy machines using multiple wheels. Badly out-of-balance parts such as those shown in Fig. 7 can be ground by using suitable attachments. Typical are such parts as automobile steering knuckles, the tangs of table knives, shanks of golf club-heads, and shock-absorber arms.

Parts such as the nose of a shell which must be ground on a diameter other than that to which the rotative force is applied may be ground as shown in Fig. 8.

Multiple diameter parts such as shafts can be ground with multiple wheels or with a single wide-faced wheel trued to the required form, Figs. 9, 10, 11 and 12.

There is no limitation as to the kind of material that can be ground. Among the non-metallic parts being successfully centerless ground are golf, pool and bowling balls; spark-plug cores; fountain pen barrels and caps; glass bottle stoppers and chemical apparatus; carbon electrodes; rubber washers;

Fig. 6. Parts to be centerless ground don't come much smaller than this clock balance staff which is produced in large quantities on a Cincinnati centerless by the infeed method. They are automatically fed from two loading magazines, one of which is loaded by the operator, while the other is in the machine.



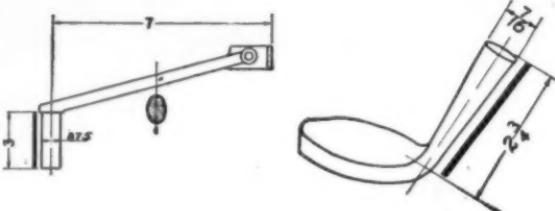
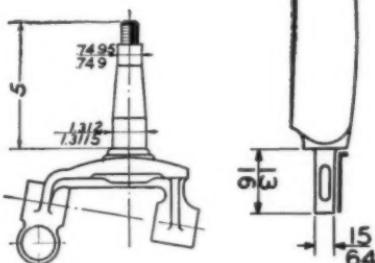


Fig. 7. Such out-of-balance parts as these are infeed centerless ground on the surfaces indicated by heavy lines with the help of a hold-down pressure device which is part of the work rest. The application and release of the device are coordinated with the movement of the infeed lever without imposing additional activities on the operator.



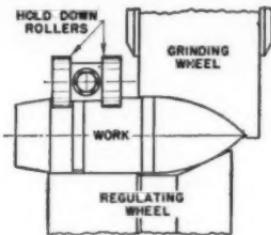
plastic rods, tubes and casters; wood rolls; and even cork.

The methods used in centerless grinding the cork cots used to protect threads in textile machinery is an excellent example of how the centerless method can be adapted to jobs far afield from its original purpose, and how seemingly unsurmountable obstacles can be overcome. The cots consist of thin-walled tubes of compressed cork, accurate in dimension and with inside and outside diameters concentric. They presented two chief problems—constant loading of the grinding wheel with particles of cork, and their tendency to stick when a thick-walled piece got between the regulating wheel and the mandrel on which it was carried while being ground. To prevent the grinding wheel from loading, it is dressed continuously by a rotary wheel dresser carried by a

hydraulic reciprocating truing attachment. To prevent sticking of the thicker cots, the regulating wheel is made of pliable rubber which gives and thus permits the cots to pass between the wheels.

Thickness and concentricity of the cork walls are governed by the distance between the mandrels and grinding wheel. The operator has only to place the cot on the nose of the mandrel. It is then snapped into position by rubber rollers. Fig. 14 shows how the cots are automatically fed to the wheel. Unloading is fully automatic as shown in Fig. 15. Production is 80 pieces per minute, with stock removal of between .040" and .050" on the diameter. Concentricity is held within .003".

While the characteristics of the centerless grinding method make it especially suited to the mass production



**Fig. 8.** This arrangement is equivalent to grinding the shell nose with a centerless chuck. It is known as "off-set centerless." Pressure rolls bear on a diameter that is not to be ground and, in effect, takes the place of the grinding wheel at that point. The sketch shows a Cincinnati set-up.

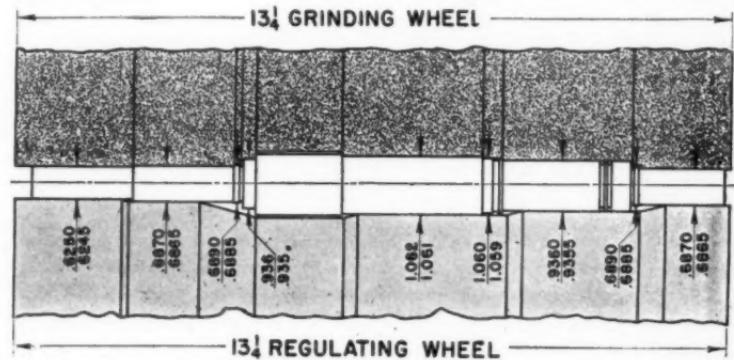
of large lots, it is often desirable to grind small lots by the same method. In fact there are jobbing shops which specialize in that kind of business. Some of them keep several machines busy full-time, all on small lots.

A typical day's production of a centerless machine in one such shop included: 27 pins  $\frac{3}{8}$ " O. D. x  $\frac{7}{8}$ " long; 208 pins  $3\frac{1}{2}$ " O. D. x  $1\frac{1}{2}$ " long; 295 pins  $\frac{1}{4}$ " O. D. x 1" long; 100 pins  $1\frac{1}{4}$ " O. D.

x  $2\frac{9}{16}$ " long; 513 bushings  $1.6$ " O. D. x  $1\frac{1}{8}$ " long with  $\frac{1}{4}$ " thick wall; one piece of wire  $144$ " long x  $.0489$ " O. D., ground to  $\pm .0001$ "; 76 screws ground on top of the threads,  $1.281$ " O. D. x  $6-13/16$ " long.

The secret of doing such diverse jobs in small lots economically is in keeping set-up time at a minimum. It is mostly a matter of intelligent grouping of the lots in an order that will make the

**Fig. 9.** This armature is centerless ground on 9 diameters with a single  $13\frac{1}{4}$ " formed grinding wheel on a Cincinnati machine. The operation is automatic, using the infeed method. The limits are  $.0005$ " overall on same diameters —  $.001$ " on others.



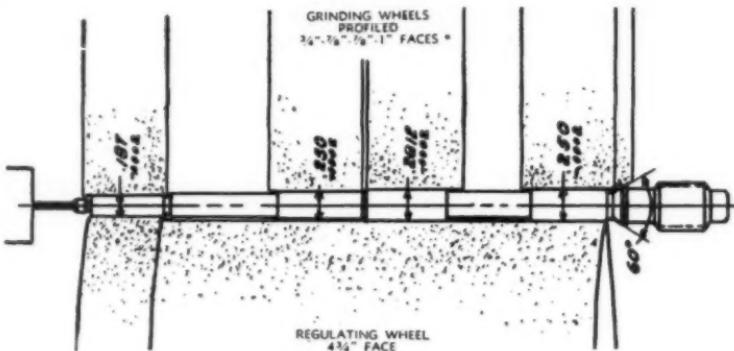


Fig. 10. Here four diameters of a worm shaft are centerless ground simultaneously on a Landis machine, using multiple wheels instead of a single formed wheel. Production is 75 per hour.

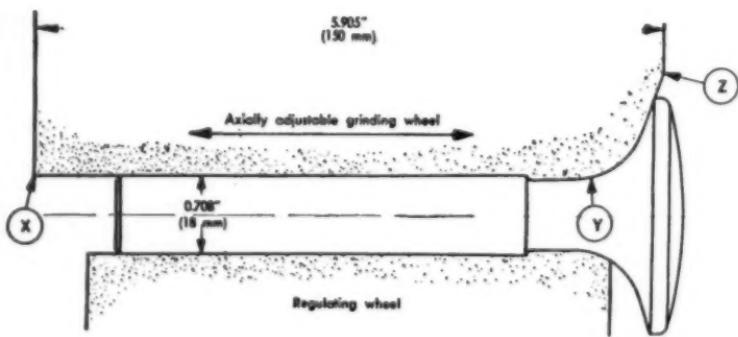


Fig. 11. This valve stem is ground semi-automatically by the infeed method on a Lidköping centerless machine using formed grinding on regulating wheels. The surface X-Y is turned with a profiling cam. The radius Y-Z is turned by a special diamond holding device. 100-120 pieces per hour are ground with a "fine" finish, round within .00008", and to size within .0002".

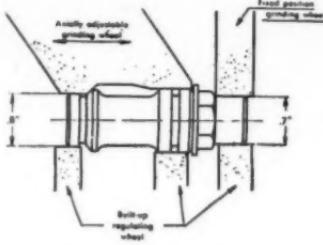


Fig. 12. Here is a combination of multiple on formed wheels grinding three diameters, one taper and one shoulder by the infeed method on a Lidkoping machine. All surfaces must be dead concentric and tolerances are .0008". Production is 80-100 per hour.

GLASS  
FINISH GRIND  
STOCK REMOVED .010  
200 PER HR.  
PLUNGE GRIND

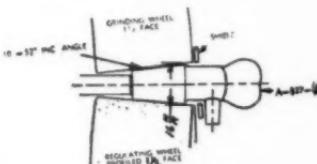


Fig. 13. This glass stopper for chemical apparatus is ground on the taper on a Landis centerless grinder.

changes in set-up between lots as short as possible. Thus, thrufeed jobs should be grouped separately from infeed lots, for changing from one type of centerless grinding to another is more time-consuming than changing from one diameter to another. However, set-up time is reduced if parts are grouped in order of their diameter sizes so that the changes in set-up, to accommodate different diameters, will be as slight as possible. This procedure should reduce set-up time at least 50% from what it would be if no thought were given to grouping the parts by diameters.

There are four basic methods of grinding by the centerless method; Selection of the best method depending chiefly upon the shape of the work-piece.

Straight cylindrical pieces such as pins, bars, wire, and many others are ground, as a rule, by what is known as the "thrufeed" method, Fig. 17, by which the parts are passed between the wheels going in at one side and coming out at the other. Only pieces which have

no projecting shoulders or other obstructions can be ground by this method.

The lateral movement of the piece between the wheels is imparted by the regulating wheel, which is swivelled slightly. The speed at which the work passes the wheels depends upon swivel angle of the regulating wheel, its speed and its diameter—increasing as any of these increase.

The best speed of traverse for thru-feed work depends upon such diverse conditions as: physical characteristics of the work material, amount of stock to be removed, accuracy and surface quality required, type of grinding wheel; diameter of part, weight of part, coolant used, and the condition of the machine.

It is evident that with so many variables entering into each job, tables showing the best traverse speed for all jobs are impractical. The practical plan is for each shop to maintain records of all jobs; when a similar one comes along the record will give at least a close starting point for determining the

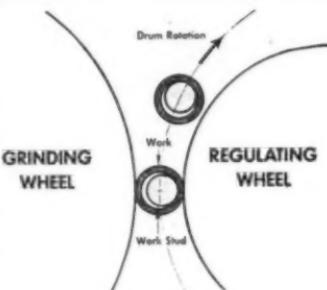
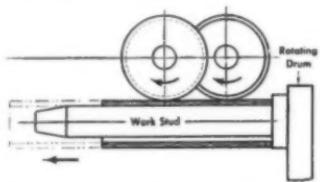


Fig. 14. The cork cots are carried by mandrels mounted on a drum that rotates eccentrically around the regulating wheel. The cots touch the regulating wheel before grinding contact is made.

• • •

Fig. 15. The rollers snap the cots off from the mandrels as soon as grinding is completed.



traverse speed. At the start considerable time can be saved that might otherwise be wasted in blind experimenting, by getting the advice of competent abrasive engineers, who have had wide experience in centerless work

The infeed method of grinding, Fig. 18, is comparable to plunge-cut grinding between centers. It is used mostly on parts having a projection such as a shoulder which would interfere with the lateral movement between the wheels in thrufeed grinding. Infeed grinding is widely used for multiple or

formed wheel grinding of profiles. The work is fed to the wheels from above. There is no lateral movement of the work as in thrufeed, so the regulating wheel is set with only a minute amount of swivel—merely enough to keep the work pressed tightly against an end stop.

While ordinarily the work is supported by a single work support blade, large or heavy pieces are often supported by two blades as in a cradle. In addition to rotating the work, the regulating wheel lifts it from the blade nearest the regulating wheel and against the grinding wheel. Parts longer than the wheel is wide, which are to be ground for only a short distance from the end by the infeed method are supported by an outboard roller support outside of the machine while the surface to be ground is supported in the usual manner by the blades.

In endfeed grinding, Fig. 19, the work is fed as in thrufeed except that instead of passing for its full length between the wheels, it is stopped part way thru by coming in contact with an end-stop. It is chiefly used in taper grinding.

For certain kinds of work the infeed and thrufeed methods are often combined. Examples are parts that would be ground by thrufeed except that too much stock must be removed for a single pass. Shells which must be ground on the narrow diameters of the bourrelet are typical. Material removal of .020" is too much for single pass thrufeed, and therefore calls for infeed grinding. The shell is placed on the workrest blades as in infeed and the thrufeed motion started.

Combination grinding is also indicated when the smaller of two diameters must be ground to a length greater than the

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width of the wheel. Fig. 20 is an example. The part is placed on the work support blade as in regular infeed grinding but with the end stop at the front of the machine instead of the back. When the infeed grinding of the diameter between the wheels is com-

plete, the end stop is moved out of the way and the regulating wheel causes the work to traverse. Combination grinding of this sort is suitable for short and light work. It requires a special work rest. A slight amount of thrufeed is sometimes imparted to a piece being

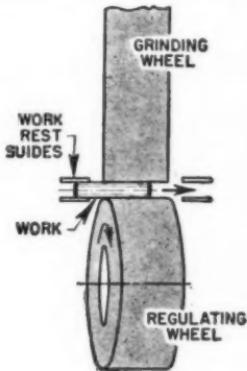
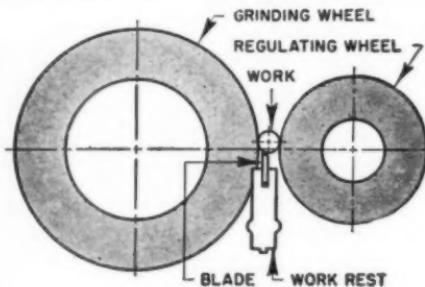


Fig. 16. Above. Elements of the centerless machine. Fig. 17. Right. Top view sketch of thru feed set-up.

Fig. 18. Top view sketch of infeed set-up.

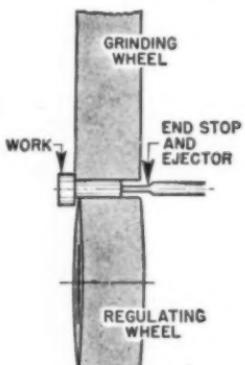


Fig. 19. Top view sketch of end-feed set-up.

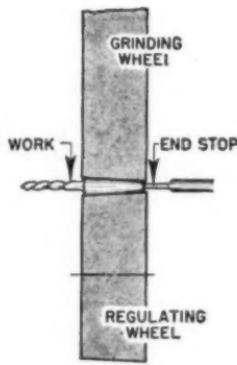
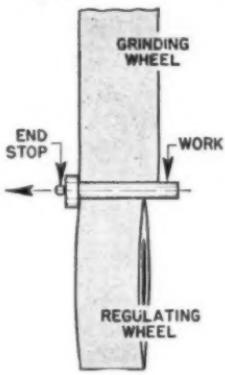


Fig. 20. Top view sketch of combination infeed and thru feed set-up.



# Turning S.A.E. 4145 Annealed, 315 S.F.P.M.



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**Operation:** Turning  $4\frac{1}{2}$ " shaft and removing approximately 23 cu. in. of metal per minute

**Machine:** 16" x 54" "AMERICAN" Pacemaker multi-production lathe

**Material:** S.A.E. 4145 annealed steel

**Spindle Speed:** 280 R.P.M.

**Depth of Cut:**  $\frac{3}{16}$ "

**Cutting Speed:** 315 S.F.P.M.

**Feed:** .017"

**Type of Tool:** Cemented carbide

**Cutting Lubricant:** 1 part Sunoco to 20 parts water

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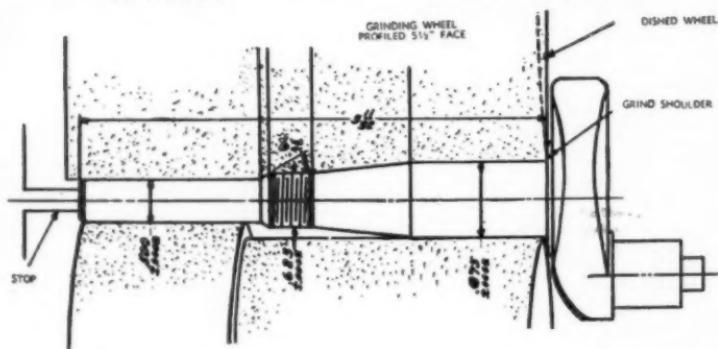


Fig. 21. The diameters are ground by infeed with a slight thru feed to the left to enable the dished wheel to grind the shoulder.

ground by the infeed method in order to face grind a shoulder, as with the crankshaft shown in Fig. 21.

Combination infeed and thrufeed grinding may also be used to straighten some parts which are warped but where the bow is not greater than the total amount of material that can be removed, and when the part is shorter than the width of the wheel. It may be useful in a shop which does not have a straightening machine. However, it is at

best a substitute method. It is always best to have work straight before putting it on a centerless grinder.

In future articles of this series on centerless grinding, we shall describe the various machines, how to select the best grinding wheel for a job, truing and dressing the grinding and regulating wheels, the use of coolants, tips on grinding, and the common troubles that may develop and how to rectify them.

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5½ square inches\* of steel removed  
at one pass of these cutters

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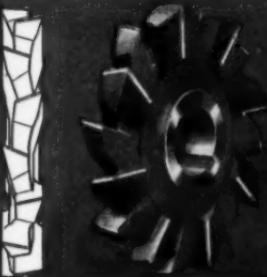
\*Cross-section area of metal removed.

● In the job above, nine slots  $\frac{5}{16}$ " wide and two end cuts  $\frac{9}{32}$ " wide . . . all  $1\frac{1}{16}$ " deep . . . are being milled simultaneously by a gang of nine staggered tooth and two half side milling cutters. That's removing 5½ square inches (in cross-section area) of low carbon steel at a single pass. These cutters are completing ten pieces per hour.

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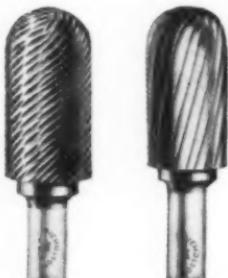
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## CLEANING

by  
Carl Zinnow

**Abrasive blasting, particularly the "airless" technique, has made great forward strides in the past few years. In this article, the author discusses some of the benefits to be derived from employing the airless-blast cleaning method.**

Of the many developments on the general industrial front which contributed so importantly toward breaking bottlenecks and cutting corners on the production line across the crucial war period, few have exceeded in all-around significance and scope of influence the airless-blast process of parts-cleaning, a fact deserving wider recognition and appreciation than it has generally received.

Faster production, lower costs, better cleaning—in this descriptive capsule you have a birds-eye view of a method that represents speed-cleaning at its blue-ribbon best. Here is a treatment making every vital minute count in cleaning a list of work that covers practically the entire field of metal products, ranging

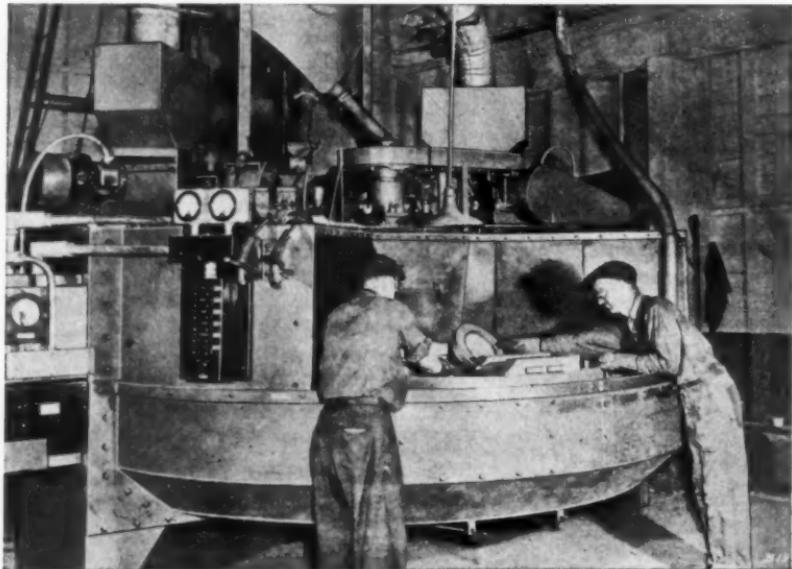
from bearings to bathtubs, carburetors to crankcases, lamp bases to lathe beds, electrical equipment to railroad specialties.

Current production practice presents overwhelming evidence supporting the method's time-saving, cost-cutting benefits.

A Wisconsin foundry, for example, now gets "faster cleaning, better appearing castings at a greatly reduced cost" from its installation of an airless machine for cleaning castings of brake drums and rings, flywheels, gear cages, cylinders, crankcases, etc. Equipment replaced was capable of handling less than  $\frac{1}{2}$  ton hourly production, the new unit stepped up cleaning output to 1.85 tons per hour.

• • •

**Two Wheelabrator units are utilized in this large Wheelabrator Multi-Table installation used in one Eastern furnace manufacturing plant to remove sand from grey iron castings at production line speed.**



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An Iowa firm making hoist elevators for shaft mines reports that cleaning time has been sliced to 4 minutes per table load, a 25 per cent saving in cleaning cost over the previous method. The airless machine replaced equipment which was operated 24 hours a day. Considerable hand-cleaning of castings was eliminated. In addition to the cost economy and better appearance for inspection, there is a marked saving in machinability, due to removal of all sand and scale right down to the virgin metal.

The following detailed discussion of airless-blasting, paying particularly close attention to various equipment developments and refinements which materially help to make the method's mass-production efficiencies possible, might prove of timely interest and constructive value to innumerable production and engineering men.

Present high standard of cleaning effectiveness that goes hand in hand with airless-blasting stems directly from the creation and perfection of the "Wheelablator"—the heart of this mechanical method—which is a specially-designed, rapidly rotating bladed wheel. Cleaning by this means, also becoming widely known as "Wheelabrating", because of the basic part this wheel plays in the functioning of the process, is performed by steel shot or grit propelled from the wheel against the work by a controlled combination of centrifugal, tangential and air dynamic forces.

This wheel bombards the work with from 300 to 900 pounds of abrasive particles per minute, depending upon size, shape and condition of parts to be treated. Completely airless, it eliminates costly air-pressure equipment and effects as well substantial savings in horsepower otherwise required for generating air pressure. The device is furnished as standard equipment on airless-blast machines which are based, both in principle and practice, on a combined tumbling-blasting action now so extensively utilized in abrasive-blasting treatments.

One noteworthy unit of this type is the "Wheelablator Tumblast." Widely employed for handling an extensive range of compact pieces sufficiently rugged to withstand a gentle tumble action, it is made in eight different sizes from one to 63 cu. ft. capacity for blast-cleaning quantities of work where individual parts vary in weight from a mere fraction of an ounce up to and including 1,000 pounds.

Embodying the continuous-conveyorizing principle of tumbling by means of an apron conveyor, either steel slot or endless rubber type, this machine fully exposes every surface of every piece to the full-fledged surface-scouring action of the abrasive-saturated blast stream. For work demanding an extremely gentle tumbling action, the rubber belt unit is recommended.

Rotation of conveyor tumbles and cascades work directly below the

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(Parentheses indicate pages of *FILE FILOSOPHY* containing correct answers)

1. What things is the mechanic in the "Wrong" picture doing incorrectly? (p. 30)
2. What three important things must filer do right to do a good job? (p. 28)
3. In what three elemental ways can file be put to work manually? (pp. 28-29)
4. What is proper height for work in vise for (a) general filing; (b) heavy filing; (c) delicate filing? (p. 29)
5. What accessories should be used for holding soft metals in vise for filing? (p. 29)
6. What is best way of holding file for ordinary filing? (p. 29)
7. What is proper way of "carrying" file across work? (pp. 29-30)
8. What is drawfiling and how should file be held and "carried"? (pp. 30-31)
9. How should file be held against work in lathe filing? (p. 31)
10. What special file is made for lathe filing and what are its features? (p. 31)

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**A 66" Wheelabrator Swing Table installed at an Ohio foundry. A large grey iron casting is shown on the work table of the machine awaiting cleaning. Only a short exposure to the Wheelabrator abrasive blast is necessary to remove all sand and scale from the castings.**

• • •

Wheelabrator blasting device. Following their impingement upon work surfaces, abrasive particles drop thru conveyor openings into a bucket elevator, which then carries shot or grits to an elevated separator and storage hopper. They are then gravity-fed to the rapid-spinning wheel. Apron conveyor is operated in reverse to unload work in cleaning chamber.

As many metallurgical engineers and production executives will agree, it is difficult to name a more gruelling task for a blast-cleaning machine to handle

satisfactorily than the cleaning of steel castings and forgings. This particular work, in most cases, is large, heavy, unusually difficult to clean properly. Yet a large-capacity machine has been developed to meet the exacting requirements associated with such heavy-duty service.

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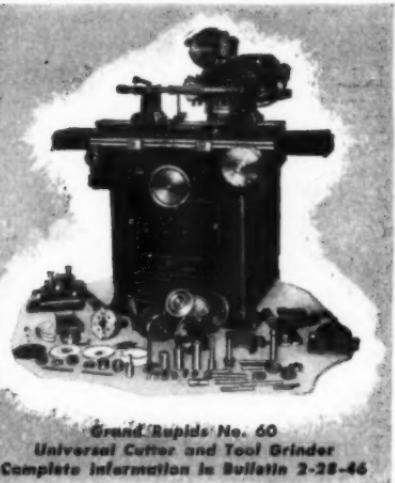
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to keep pace with other fast-moving production operations. In a number of such instances, loads weighing from 1,200 to 2,500 pounds of work are being cleaned in from 6 to 15 minutes.

Economies of Wheelabrating have been extended to flat or fragile work not readily adaptable to tumbling by the development of the table-type blasting unit, which is supplied with either a single table or a number of connected independent work tables, depending

• • •

**A 6' Plain Wheelabrator Table installed at a Mid-Western jobbing foundry for cleaning miscellaneous grey iron work. The Wheelabrator Plain Table with its single rubber covered work table is designed for handling work which does not have too many pockets and vertical edges. Work to be cleaned is placed on the exposed area of the single rubber covered work table at the front of the machine. Rotation of the table exposes the work to the abrasive blast from the overhead Wheelabrator unit provided.**

upon type and size of pieces to be cleaned.

The plain table is a single rubber-covered unit which carries the work into and through the blasting zone, and is used for cleaning parts having only minimum pockets or vertical edge. The multi-table unit, on the other hand, is a high-capacity, general-purpose machine employed for handling large intricate castings, forgings and other metal items which have intricate cavities, deep



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pockets and crevices or high vertical edges.

With either of these particular units, work to be cleaned is simply placed on one of the rubber-covered tables, which revolve automatically upon approaching the blasting zone and continue to do so until leaving its field. The multi-table model, originally introduced several years ago for rough and finish cleaning of stove plate before plating and enameling, soon found quick ac-

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Where use of the "Tumblast" or "Multi-Table" machine is not feasible because of special production requirements or the size and shape of parts being such to make them unadaptable for handling in a standard unit, special cabinets are available. A few of such products being cleaned in this manner today include steel sheets, plates, tube, bars, rods and billets. "Custom-tailored" to meet individual blast-cleaning requirements, these units incorporate work-handling methods most suitable for presenting parts to the one or more Wheelabrators utilized and, at the same time, give certain classes of work a rolling, tipping or spinning motion during the blasting cycle to assure maximum coverage and removal of surface contaminates.

In addition to its mass-production efficiencies and demonstrable operating economies for a great many types of work cited at the outset of this discussion, airless-blasting equipment of the types described provides a number of other substantial advantages, many of them highly important from certain key processing standpoints. Surface-finishing versatility is a primary one.

Virtually any type mechanical finish, ranging from fine to coarse, may be produced by proper selection and type of abrasive. Lightweight parts can be given a satin finish; castings, forgings, heat-treated parts and similar products can be completely rid of burned-in sand and heavy baked-on scale.

A second important processing benefit Wheelabrating provides, is its marked contribution to improved machinability of heat-treated parts. With the use of these speed-cleaning machines, removal of normalizing, annealing and forging scale becomes a relatively simple matter because the hard-hitting steel abrasive quickly removes the deposit right down to the bare metal surface. Every nook and cranny of the



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part is completely scoured until every last vestige of scale is removed.

Equally noteworthy in this connection is this mechanical method's overall superiority to acid-pickling practices in descaling and derusting operations. Sand, scale, rust and dirt are removed from the smallest fissure and hair-line crack with absolute freedom from the danger of hydrogen embrittlement or smut formation which may easily result on certain alloy steels if a suitable inhibitor is not employed in the pickle bath or the operation itself not otherwise carefully controlled. Then, too, chances of pitting work too deeply so that it cannot be cleaned up are also sidestepped. For these and other reasons, commercial heat treaters and forgers are using pickling processes less and less for rust and scale removal operations.

Production of a genuinely clean and dry surface—one which requires no further treatment prior to application of protective coatings or decorative finishes—is a third outstanding processing advantage. Grit blasting for surface preparation of metal to be painted or plated, moreover, has been found advisable in countless instances because it breaks up the smooth surface, providing a

"tooth" or base of good-grippage to assure a better bond for the subsequent coating.

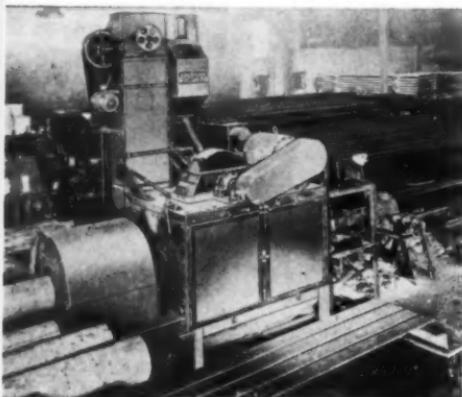
Airless-blasting removes small fins and burrs from machined parts so oftentimes inaccessible with a file. It removes light tool marks and eliminates chipped and rounded corners, so that only a minimum amount of stock need be allowed for finish machining. Still other effects of Wheelabrating include prolonging life of tools and cutters, reducing frequency of grinding and wheel-trimming, simplifying and speeding up inspection, assuring accuracy of hardness readings.

To secure maximum results from airless blast-treatment, certain points must be watched and checked if peak equipment performance is to be maintained. First and foremost is the absolute necessity of keeping the abrasive clean.

Sand, scale and broken-down fines retard the cleaning action of the metallic abrasive and greatly increase wear rate on the blasting machine. Instances have been known where failure to keep such foreign matter out of the abrasive has resulted in as much as a 50 per cent slower cleaning speed, to say nothing of the increased wear on parts, and a far-from-perfect cleaning job with a smudge being deposited on the work.

A ventilating and dust-collecting system of adequate capacity and proper design is the answer to this problem. It will keep blasting equipment up to

• • •  
**Wheelabrator Special Cabinet of Pipe Line Service Corp., Franklin Park, Ill., used for reconditioning used gas line pipes. The pipes being cleaned in this machine have lain in the ground for as long as 20 years. During this time a heavy scale and oxidation has occurred on the pipes. The scale-encrusted pipe is shown at the left of the machine passing through the Wheelabrator abrasive blast area. A tarring mechanism follows the wheelabrator operation, after which the pipe is covered with special paper.**



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**ENGINEERED**  
**BLADE**



Luers Patented Cutting Off Blade is the only truly engineered cutting-off blade! Note these exclusive, outstanding features: Hollow-ground top, extreme side clearances, pre-sharpened ready to use, resharpening required only on front face, made of special high speed steels developed expressly for cut-off blade use. Will increase your production, save sharpening and down time. Now accepted as the standard blade by all leading machine tool builders.

You may not realize it but you may be overlooking some good opportunities of increasing your production. There's no obligation in asking one of our engineers to discuss this with you.

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**EMPIRE**  
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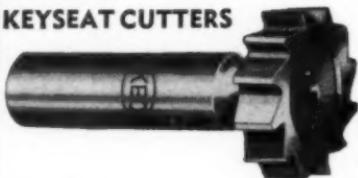
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Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from  $\frac{5}{8}$ " to 1" are .0005" undersize at small end, from  $1\frac{1}{8}$ " to 3", .001" undersize. Immediate delivery.

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Illustrated literature and prices on all KEO Products mailed on request.

## KEO CUTTERS

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maximum cleaning efficiency if the system is given care and attention. Key points to consider in making a periodic check-up include dust collector tubes, vent piping, abrasive separator, cover plates and inspection doors.

It may be said in conclusion that, as plant experience commonly proves, airless abrasive blast-cleaning already has attained a high level of efficiency and economy. Yet, its contributions to faster production, lower costs and better cleaning are bound to increase still further during the years immediately ahead not only because of its steadily broadening scope of application but also because of the improvements in construction design and equipment operation destined to follow in the wake of the vigorous scientific research leading blast-machine manufacturers are continuing to devote to the technique.

## Seniority and the Labor Laws

When industrial leaders come to grips with labor problems in their own plants, they should KNOW not only the human side but the legal as well. These two books deal with questions of seniority and give the details of Federal laws. Every plant executive should have them.

**"Problems of Seniority" . . .** Deals with transfers, leaves of absence, grievance procedures and seniority disputes, how seniority is lost and acquired. Cloth bound, 295 pages, fully indexed,  $5\frac{1}{2} \times 8\frac{1}{4}$ ..... \$4

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Chicago 5, Ill.

## MICRO DRILL CHUCK

Chicago - Latrobe has announced its Micro Drill Chuck. They state that this is an adjustable collet chuck, which can be adjusted to perfect concentricity.

This will be available in two different size collets, the smaller ranging from .005" to .025"; the larger will range from .020" to .040".

It is further announced that once the drill has been aligned with the spindle on which it will be used, it will not be necessary to readjust the drill chuck when a change of drill is made. The company has a regular stock of Micro Precision and Watchmaker Drills to replace drills which become dull in operation and require resharpening.

A circular has been published which illustrates and describes this new tool. Specifications and prices are also included. This may be obtained by writing to Dept. BB, Chicago-Latrobe Twist Drill Works, 411 Ontario St., Chicago 10, Ill.

## PORTABLE BASE FOR MACHINE TOOLS

A new idea to aid in the machine shop has been reported by Race, Inc. This is a portable base for small machine tools. This base combines a stand on which may be placed any small machine tool by clamping or bolting and a large seat, provided for the operator to use while working.

Three point support is provided including two 4" rubber casters and a leg underneath the seat which is tipped with non-skid rubber.

This portable base is designed to allow most efficient use of machinery, especially when the same tool must be used in several different places.

For illustrated literature, write to the manufacturers, Race, Inc., Dept. BB, 3010 Hiawatha Drive, Dayton 5, Ohio.

## "FARREL GEARFLEX COUPLINGS"

A 46-page bulletin, No. 447, entitled "Farrel Gearflex Couplings," completely describes various types of couplings for use in industrial service, manufactured by the Buffalo division of Farrel-Birmingham Company, Inc., Ansonia, Conn.

The booklet, with the aid of many photographs, drawings and installation illustrations, gives a clear description of coupling functions, plus recommendations of the correct types for specific applications. Included also are complete engineering data with ratings, dimensions and weights. Write Dept. BB.



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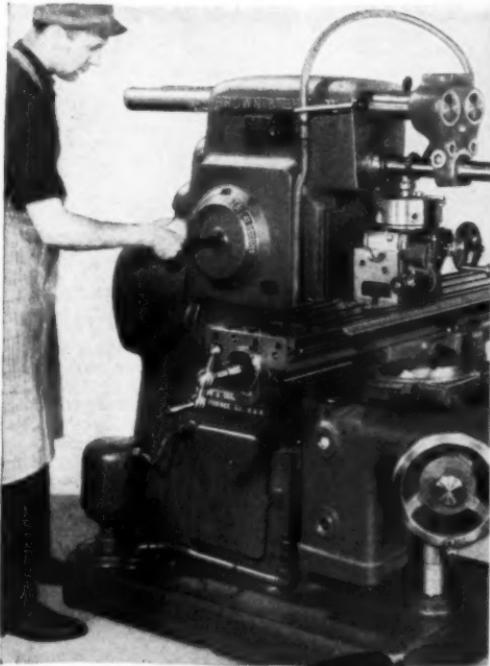
Bonds are selected for their ability to hold diamond particles securely until completely consumed.

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*For all the facts, write for Bulletin 45A.*

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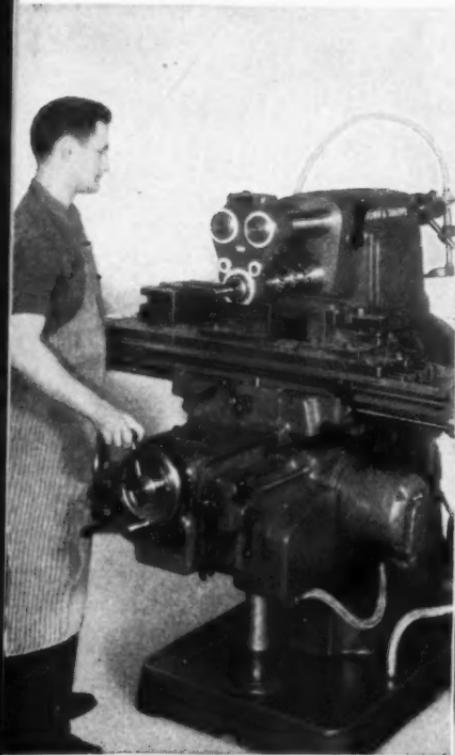


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Stroke .....	2½"
Distance between gibs.....	9"
Adjustment of slide.....	3"
Bolster plate area.....	13½" x 23"
Opening in bed.....	8"
Bolster plate thickness.....	1½"

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adjustment up .....	8½"
Flywheel diameter .....	28½" x 5¼"
Gross weight.....	3000 lbs.
Floor space .....	32" x 32"
Overall height .....	6' 2"
Motor requirement.....	2 HP

**INTERCHANGEABLE FRAME FOR A FULLY  
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. . . from selected steel.  
Thin walls and strong, tool  
 $\frac{3}{8}''$  -  $\frac{1}{2}''$  -  $\frac{3}{4}''$  Square Drive.



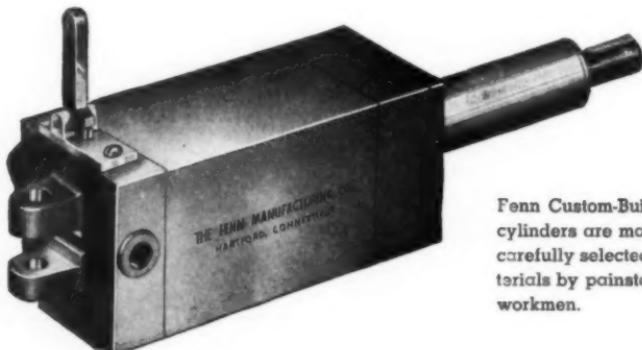
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Lighter, more accurate, this tap holder drives the tap by the square of the shank — holds it in alignment by the round — tap shanks are never "chewed up".

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# **CUT YOUR BURRING COSTS with Rotary Files**

Chicago Pneumatic's wide range of small pneumatic grinders includes tools of ample power and speed for all types of rotary file work. Small, light, compact design provides perfect balance. Rotary operation insures a smooth, vibrationless flow of power. CP rotary air motors always run cool, and cannot be harmed by overloading.

Invaluable for a multiplicity of uses, tools are furnished with numerous handle and throttle designs, as well as spindle extensions

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Made in over-all lengths of  $5\frac{1}{8}$ ", 9" and  $12\frac{1}{4}$ "; they can also be furnished with 14" and 27" extension spindles. Wheel capacities up to  $2\frac{1}{2}$ " in diameter. Weights:  $1\frac{1}{4}$ , 3 and  $3\frac{1}{2}$  pounds.

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# Letter from England



ROBERT HUTCHESON, Editor  
MACHINE SHOP MAGAZINE (London)

THE FORMATION of the Production Engineering Research Association has opened the way for investigation into all manner of problems relating to engineering production. It was long felt that there was a need for systematic research on production engineering techniques, and in 1939 the Institution of Production Engineers started a Research Laboratory at Loughborough Technical College. This laboratory (now moved to Melton Mowbray) is the nucleus of the new Association which has been formed by the Institution of Production Engineers, the Machine Tool Trades Association, the Gauge and Tool Makers' Association and the National Federation of Engineers' Tool Manufacturers.

The new Association has been recognised by the Department of Scientific and Industrial Research as one of the National Research Associations to the extent that the Department is prepared to give considerable financial backing to the new venture. Premises at Melton Mowbray consist of a large house and outbuildings in 8 acres of ground. The house is being converted into administrative headquarters, library, lecture room, etc., and the outbuildings will afford 10,000 sq. ft. of space for well-equipped workshops where practical research will be undertaken.

Activities of the new body will not be limited to serving the machine tool, cutting tool and gauge making industries. If adequately and vigorously supported the Association can serve the whole of the engineering industry, and it must be borne in mind that the Association represents not only the suppliers of manufacturing equipment, but also users.

\* \* \*

Labour and steel seem to have been the main themes of these letters so far, but every engineer will acknowledge the importance of these two items.

So far as steel is concerned, figures issued by the British Iron and Steel Federation show that production during November







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Haskins Flexible Shaft Machines meet the demands of modern competition. They are quality machines—built of quality material by men of experience, experts in their line. The flexible core, made of special Swedish music wire—the heavy duty rubber fabric casing—the removable casing ends—the ball bearing grease-sealed spindle—the amply-powered motor—these are outstanding features.

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multi-speed, counterhaft unit, 1800  
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FLEXIBLE SHAFT EQUIPMENT

was higher than that during any other month during the year. The rate of output for November was 13,715,000 tons per year which is 509,000 tons per year more than in October and compares favourably with the November figures for 1945 and 1939 which were, respectively, 12,870,000 and 10,320,000 tons per year.

Pig iron production was down. In November the rate was 7,903,000 tons per annum compared with 8,102,000 tons per annum in October.

\* \* \*

What the automobile industry is doing seems always to be of interest. The Society of Motor Manufacturers and Traders have decided that neither a motor exhibition nor a commercial motor transport exhibition will be held during 1947. Production for home and export markets is to be concentrated upon, and it is thought that exhibitions will interfere adversely with current production.

The idea of a people's car appears to be coming nearer to realisation. Sir Miles Thomas, vice-chairman of the Nuffield Organisation, says that this car must be for the British Empire and not only for the British Isles. Much work has been done

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**Mrs. Lovejoy Flexible Shaft Couplings**  
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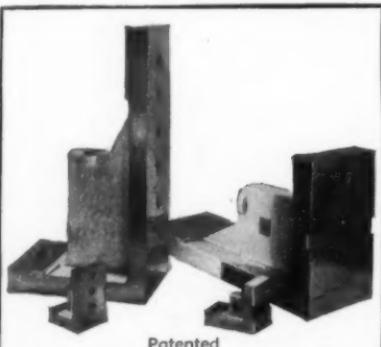
towards production of a people's car, and models have been tried out in this country and abroad.

Sir Thomas commented upon the rate of car taxation in America which is so very much lower than that in Britain and has contributed much towards making the car a major part of American daily life.

At a recent meeting of the National Association of Colliery Managers, Dr. Murray Macgregor, former assistant director to the Geological Survey of Great Britain, spoke of the need for Scotland to re-assess her mineral wealth in terms of materials, quantity and accessibility.

As examples of the value of such a move he mentioned a survey which revealed considerable quantities of mica in the Knoydart neighborhood, felspar in South Harris, and silica sands at Loch Aline. During the war when silica sands were wanted urgently for optical glass and felspar and mica were also in demand, these home deposits proved themselves to be very valuable.

What may prove to be a very important move is one which has just been announced of the agreement of amalgamation of the British Employers' Confederation and the Federation of



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The No. 2 tapper drives from  $\frac{3}{8}$ " to  $\frac{3}{4}$ " and No. 3-A drives from  $\frac{1}{2}$ " to  $1\frac{1}{4}$ " in any tapable material.

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Standard Gorton Tracer Controlled 3-U  
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Profile of turbine impeller  
blades is determined by  
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Operation—Mills 30 impeller  
blades in machined aluminum  
blanks with automatic  
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Actual Cutting Time—1 minute per blades 30 minutes per impeller.  
Cutting Tools—.030" single flute cutter  
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1A

British Industries. It is anticipated that it will take several months before amalgamation takes place but during this period the two bodies will work in close collaboration.

The set-up hitherto has been that B.E.C., which consists of employers' federations in industries employing 70 per cent of Britain's industrial personnel, has dealt with labour problems, while F.B.I. has been concerned with commercial and economic matters appertaining to its membership of 250 trade associations and 4,500 individual firms.

The reason given for the proposed fusion is that the war years proved the value of close collaboration between the two bodies. Many problems arise today that involve both labour and commercial issues and such problems are best dealt with by one organisation instead of two.

\* \* \*

Advantages that may be gained by British industrialists from a study of some German methods were outlined by Sir Stafford Cripps (President of the Board of Trade) when he opened an exhibition organised by the Board of Trade. This exhibition shows German design and manufacturing technique over a wide field. Among the exhibits was a Maihak strain gauge in which the frequency of transverse vibrations of a wire in the test gauge is matched optically against the frequency of a similar wire in the reference gauge. This is said to be an extremely sensitive instrument. Developments made by Krupps in the field of sintered carbides were exemplified by a percussive rock drill tipped with a carbide including cobalt. This is said to have a high resistance to impact and to reduce drilling costs.

\* \* \*

Sir Stafford also drew attention to the wealth of information contained in reports prepared by combined Intelligence Objectives Sub-committee and later by the British B.I.O.S., and the American F.I.A.T., and over 1,400 reports have been prepared. Over 10,000 investigators (industrialists, technicians and scientists) visited Germany where over 10,000 separate factories or business premises have been visited.

\* \* \*

Reparations from Germany are now arriving, including heavy industrial plant. Heavy presses, used for drawing steel cartridge cases at Hanseatische Kettenwerk at Hamburg, are to go to a Royal Ordnance Factory where they will be used experimentally. Heavy machine tools have been allocated mainly to the builders of steel works plant.

\* \* \*



*From Flexible Shaft Headquarters*

# WYCO

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# Flexible Shafts



**WYCO**  
**Innerliner**

Makes core run more smoothly.

Transmits more power.

Prevents excessive wear.

Protects piano wire core from frictional contact.

Prevents core crystallization — prolonging life.

Insures cool and truer running shafts, free from vibration.

When you need a replacement shaft, see that it is a WYCO. Turn that extra motor into a flexible shaft machine with a WYCO —  $\frac{1}{2}$  HP Shaft 6 ft. long complete with coupling to fit your motor — \$31.00 — other sizes from  $\frac{1}{4}$  to 2 HP. Remember WYCO Shafts include the greatest advance ever made in flexible shafting — the WYCO Patented Non-Metallic Innerliner (left). There are no kicks about shaft breakdowns when it's a WYCO. Send for catalog.

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**FLEXIBLE SHAFT**  
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No down-time for warm-up . . . no clogged  
coolant pipes . . . no odors or discoloration . . .  
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COOLANT  
IS PURIFIED  
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By Ned Bailey

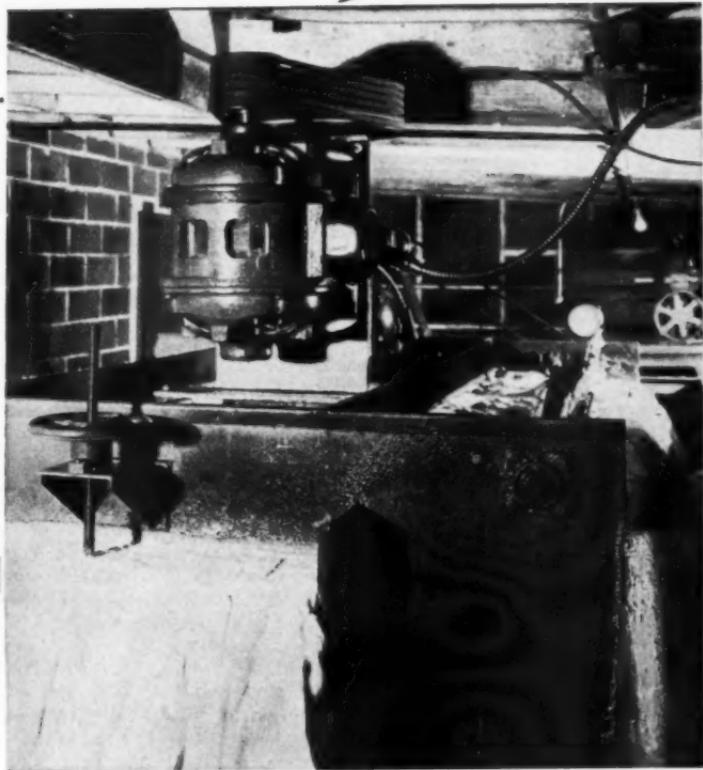


Fig. 3

The motor which operates the "Rotor-Stater" is located above the tank. On the left the scum and light foreign matter which rise to the top in the froth are removed into the dirty coolant by skimmer blades. The 99% clean coolant is seen flowing from the clarification chamber (lower left) to a tank from which it will be pumped back into the system.

A number of years ago a manufacturer of piston rings was mystified and very unpleasantly surprised by the return of several thousand dollars worth of rings from an airplane engine manufacturer. The rings had left the piston ring plant several months before, having passed all inspections satisfactorily. The airplane engine manufacturer, when he had received them, found he would not need the rings immediately and placed them in storage. Some time later, when the rings were needed and removed from storage, they looked like anything but the perfect rings they were supposed to be. They appeared to have crystallized, and what had been a highly polished finish on the inside of the ring now was all pitted and chipped.

The piston ring maker after a thorough investigation came to the conclusion that metal particles in the coolant he was using adhered to the ring during the lapping process. When the press came down on the ring these small metal parts became lodged in the ring surface. Polishing and finishing helped the deception rather than disclosing it. The problem was to evolve an economical and effective method of providing an absolutely clean coolant.

In discussing his problem with an engineer, who had for many years been designing cleaning equipment for the dry cleaning industry, he was told not to worry, that his troubles were over. "It should be harder to remove the dirt from the naphthalene we use to clean clothes, than it would be to remove metal from the kerosene you use as a coolant", remarked the engineer. The piston ring maker was a bit skeptical, but very much interested. "Go ahead and do it, but don't take any longer than you have to", he said.

That is how one concern got its start in the coolant control business. It took the cleaning and dyeing engineer five months to produce a machine that

would successfully clarify the coolant for the piston ring maker. The first machine he produced looked, we are told, like a "Rube Goldberg Cartoon," but it worked. Its multiplicity of pipes and valves made its appearance so unique that the piston ring manufacturer felt if one more valve were added he would have a likely candidate for the Smithsonian Institute. A few months later its engineer designer was sought out by a large bearing manufacturer who wanted 10 machines "just like" the one he made for the piston ring concern. To make perfect bearings they had to have clean coolant. It was then that the engineer's employers decided to go into the manufacture of coolant control equipment, "in a small way". From this meager and accidental start the business has grown to million dollar proportions.

Coolants and coolant controls are developments of comparatively recent years, having grown in importance with the development of the machine tool industry and of metals and materials for use by that industry. Above all the need for accuracy, another element that enters importantly into this field, is greatly facilitated by the use of proper coolants and their effective control. Metal bearings of various types are of course among the items requiring all the care and attention that can be given any product in order to produce the perfection they must have. To get first hand information on the part that coolant control plays in their production we visited the McGill Manufacturing Company, Inc., at Valparaiso, Ind.

This coolant control installation was made by the U. S. Hoffman Machinery Corp., so we asked that one of their field engineers accompany us when we visited the McGill plant. Interestingly enough we were assigned the engineer previously referred to as the designer of the original coolant machine. This gentleman explained to us, during our



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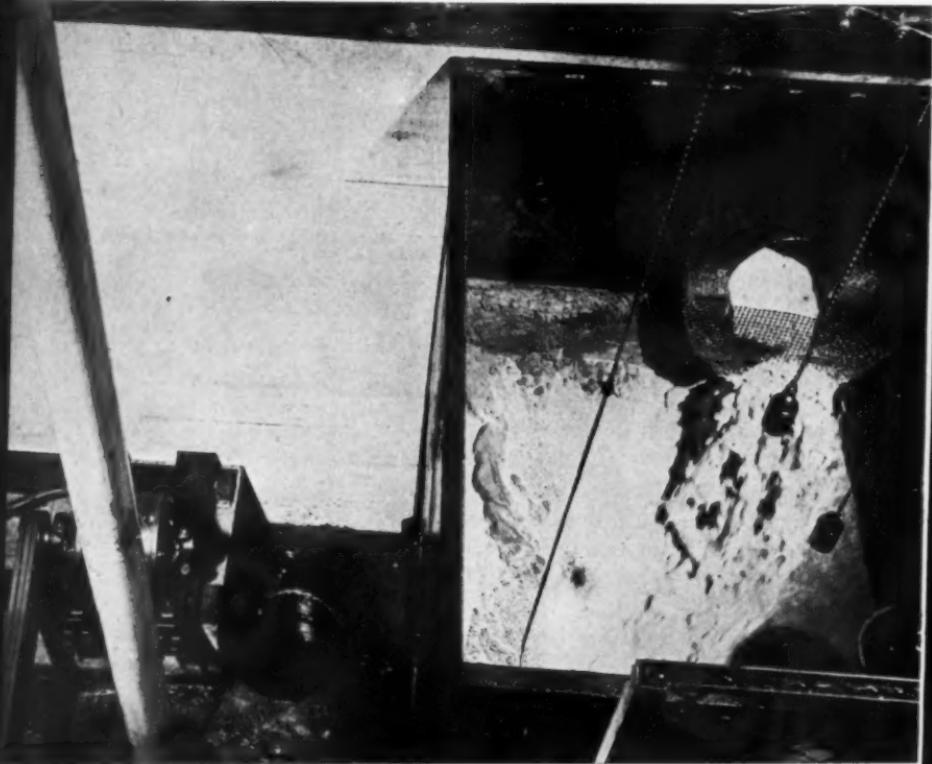
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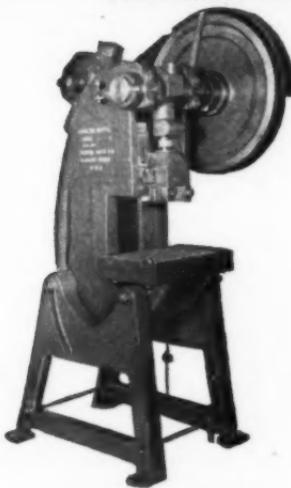
trip to the plant, that at first they were only interested in removing metal and dirt from coolant with individual units for each machine serviced. As the work of perfecting the coolant control equipment progressed many other conditions

developed that required attention. Some of the more important were the secretion of gum sludge, metal particles and dirt on the machines, in the oil lines and in the reservoirs. . . . rusting of work and machines. . . . decomposition of

Fig. 1. The sump into which the dirty coolant drains is shown on left. The weights and float are part of the system, not only regulating the operation of the various pumps, but also designed to prevent flooding in case of accident. When sump fills to a point just below sewer overflow outlet (seen at lower right), the float lifts and a contact is made which automatically starts the pump shown at the left. This pump sends the dirty coolant up to the flotation tank. When the sump is emptied, the pump is turned off automatically. The system can be drained through the sewer overflow pipe, if need be.



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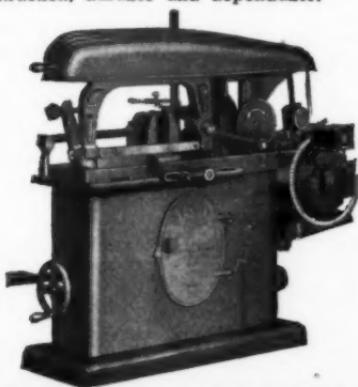
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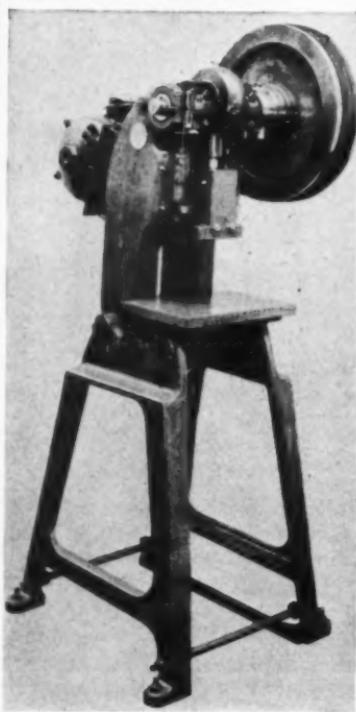
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coolant. . . . dermatitis. . . . rancidity and odors. . . . keeping coolant cool. . . . burning of work. . . . conservation of coolant or cutting oil. Some coolant control systems, such as the one at McGill's, have been developed to a point where they have completely overcome most of these difficulties.

In passing, one thing must be noted: it is not our intention, in this article, to go into the matter of the selection of the right coolant or cutting oil. This we intend to cover at some future time. We will take it for granted that you have made the proper coolant selection for if you haven't there is nothing that a coolant control system can do. At the McGill plant, their production engineer, Mr. Max Bode, was using a coolant that fitted his needs perfectly.

There are two types of coolant control equipment used at the McGill plant, the unit type for individual machines and the central coolant control system which handles the material to and from a number of machines. In this article we will describe the latter type.

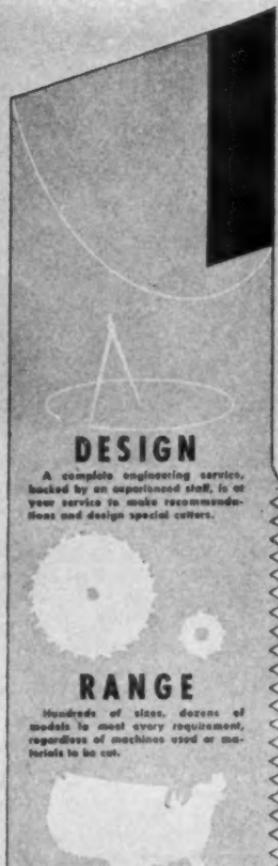
Generally speaking, the two most important things for a coolant to accomplish are to keep the work cool and get chips and other foreign matter away from the area of cutting action. It is not hard to move this matter away from the tools and work providing it will float easily in the stream of coolant. Also, there is not much trouble experienced in forcing out larger chips

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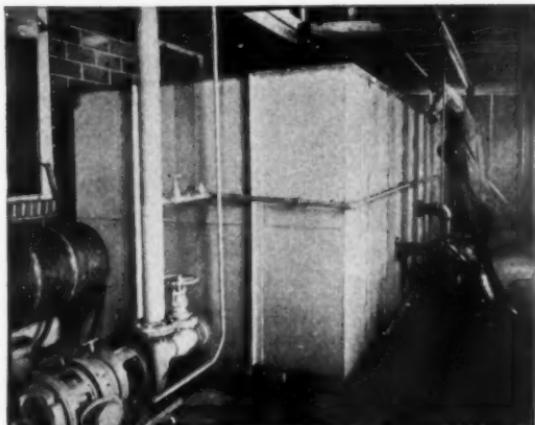
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Fig. 2. The flotation tank seen from the clean coolant end. Left center is the rotor pump which forces the coolant up into the clarification chamber. The pump at lower left returns the pure coolant to the machines in the plant.



and foreign bodies from the coolant itself. But the uncountable billions of microscopic particles which remain suspended in the coolant, often remain there to damage tools and work and are a source of considerable loss because they are a dominant factor in lower tool life and inferior work finish.

At first coolant control units were designed for serving one machine only. The cost of these individual installations, in a plant such as the McGill Company's with their hundreds of machines, all using the same type coolant,

was prohibitive. Another factor, and a very important one, was the matter of added space the individual units would take. The United States Hoffman Machinery Corp., Filtration Division, was given the job of designing some method of controlling their coolant for a large number of machines. The Hoffman Company's experience in the design and installation of other central control systems provided the "know-how," that was a factor in their selection.

At McGill's there were some 100 machines serviced by the central control

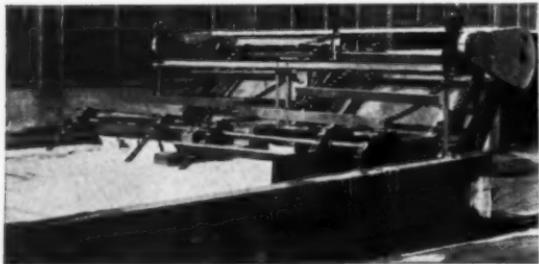
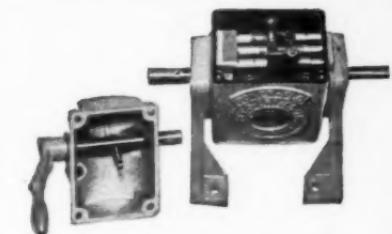


Fig. 4. This tank, although not the one used at McGill's, shows the arrangement of the sludge-removal skimmers on the operation chain. These chains run down to the bottom of the tank, along which they carry the skimmers, scraping the sludge from the tank bottom and delivering it to the removal hopper. From here the sludge empties by gravity to the removal car.

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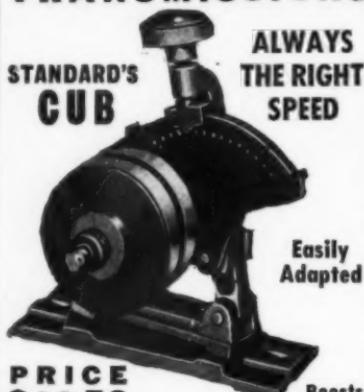
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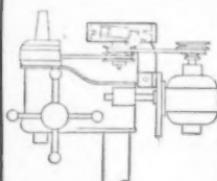
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1-2.5	400	1300
1-3	333	1080
1-3.5	286	920
1-4	250	810

\*Reduction ratio between motor pulley and driven pulley. Figures above based on 1800 RPM Motor Speed.



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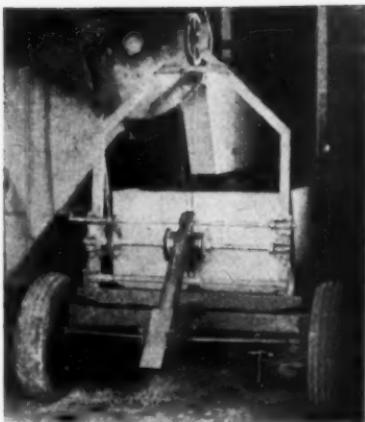


Fig. 5. A large sludge removal car under sludge discharge hopper at end of flotation tank. An overhead pulley attached to winding hub provides a simple dumping arrangement on this car.

• • •

system. They are distributed about equally, throughout two large sections of the plant. A drainage system was designed to take the used coolant, by gravity, from these machines to a sump. From there it is pumped to a flotation clarifying unit. A small addition was built to the plant to house the flotation unit and the sump. A main drain for each wing of the building was built to handle the dirty coolant from the machines in that wing. These two main drains were joined into one just before reaching the sump, Fig. 1, into which they were emptied. From the sump the dirty coolant or influent is pumped into the flotation tank at a point just below the liquid level maintained in the tank, or about 4' from the floor. The flotation tank, Fig. 2, is about 6' high. In it the heavier dirt and metal particles, in the coolant, settle to the bottom of the tank.

There is a clarification chamber lo-

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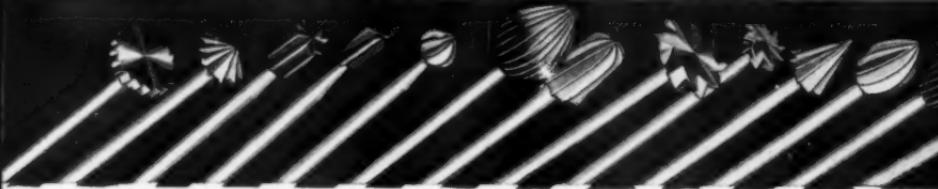


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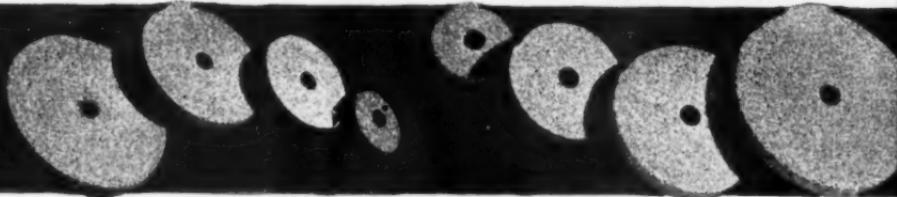
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Illustration shows *American* Hydraulic T-4-24 Broaching Machine tooled for broaching cigarette holders and pipe radiator stems.

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Two parts are loaded into fixture and the broaches lowered, by means of a special hydraulic retriever unit, thru the parts till the shank ends connect to the pull heads. The main hydraulic machine slide then pulls broaches thru parts—operator removes parts, slide is then reversed to bring broaches up to retriever unit which hydraulically raises to extreme up position ending one complete cycle.

As operator's only function is to insert and remove parts and operate machine levers, production is high—250 pieces per hour. Tolerance is held to .001.

cated about the center of the tank, about 4' from the bottom. At a point just below liquid level, a flotation pump forces the dirty coolant through a sort of an egg-beater device or rotor-stator in the clarification chamber. Thru the action of the rotor stator device the coolant is churned to such an extent that a froth is formed. This froth rises to the top of the chamber. Most of the finer dirt, scum and light foreign matter rises in this froth and is removed by a swab or skimmer, Fig. 3. The blades of which are constantly passing over the top of this chamber thru this froth. The remaining froth and the spill-over coolant drain back into the dirty coolant tank Fig. 4. The balance of the coolant in the clarification chamber, now practically clean, passes out thru a flotation cell, where it is further purified, to the clean supply line from which it is pumped back to the machines thru an overhead pipe line system.



**Fig. 6. Double discharge hopper is also available, as are small removal cars. Sludge removal skimmers are seen at top of discharge hopper.**

• • •

The sludge, which has collected in the bottom of the dirty coolant tank, is picked up on baffles attached to a chain driven conveyor. Fig. 5. These baffles, which run about the full width of the tank, leave and re-enter the tank at the discharge end. They carry the sludge to the top of the tank where they automatically dump the sludge into a tank truck. Fig. 6. For easy removal this truck is mounted on wheels and is rolled out and dumped when necessary. Fig. 7.

As there is a certain amount of evaporation of the water in the coolant both in work and while passing through the flotation system, water is sprayed into the tank thru several 1" spray headers.

**Fig. 7. Hooked to tractor, large sludge car is removed to dump.**

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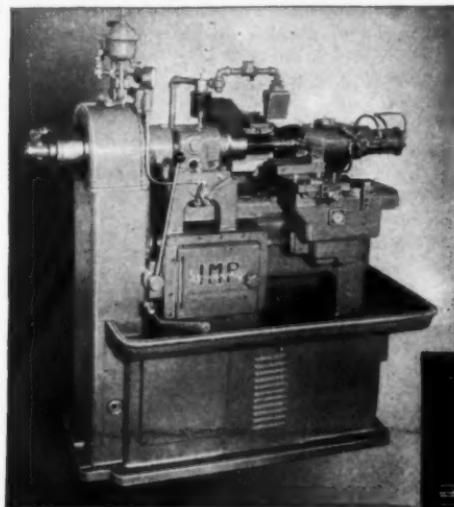
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# MACHINE OF THE MONTH

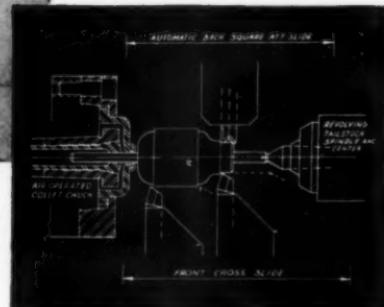
PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



## ROTOR AND STARTER COMMUTATORS

*Automatically MACHINED  
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**SOLUTION:** The Lo-swing IMP Lathe with special equipment was selected for this job primarily because of inherent design features which permit high spindle speeds and unusual turning accuracy.

The work is held and driven from one of the ball-bearing seats of the shaft with an air-operated collet chuck. The tailstock end is supported on a revolving center, the movement of which is actuated by an air cylinder. This method of holding and driving the rotor

assures the close concentricity which is required between the bearing seats and the O. D. of the commutator. The operation consists of turning the O. D. of the commutator and rotor, the facing of the shoulder (which is part of the commutator) and the chamfering of the shoulder.

Several other Lo-swing set-ups have been developed for this type of work. We suggest you send in your prints for our estimate.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

## LATHE NEWS from SENECA FALLS

The coolant itself is added when needed.

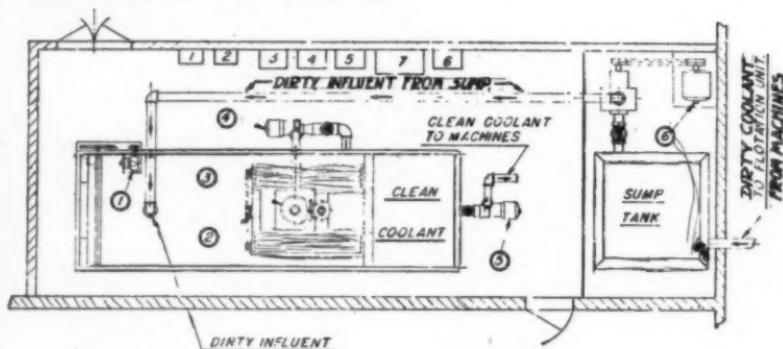
In an effort to evaluate the worth of the coolant control system at the McGill plant a number of facts were taken into consideration, some with a more easily estimated value than others. The facts were considered in a comparative way—before and after installation.

According to Mr. Bode, with the central coolant control system in operation many costly and unpleasant conditions that existed before its installation were eliminated. Starting with the pre-control days, Monday morning warm-up down-time. Now, the night man on duty Sunday night, following the directions on a large chart goes to the coolant control room and pushes each switch in order from 1 to 6 inclusive, see Fig. 8. This he does about an hour or so before the machinists start work. When they arrive they can go right to work. The temperature of the coolant is under control and clogged pipes are a thing of the past. The condition of the coolant solution from the standpoint of stability of emulsion, lack of odors and discoloration, are the finest he has ever had.

Twenty-two and eight tenths parts per million of dirt in solution after the flotation treatment is, says Mr. Bode, "practically negligible." A saving of 700 lbs. of Oakite—33% savings in oil—savings in wheel life—elimination of rancidity—elimination of dermatitis and the consequent reduction in absenteeism—reduction of medical expense and saving of 150 lbs. of skin antiseptic—elimination of rust and the easy removal of thousands of pounds of sludge and finally a total cash saving of \$1137 in a four months period. For a system serving about 100 machines, Mr. Bode feels his central coolant control is an excellent investment. All we can add to this is, that in Mr. Bode the system has the best of supervision.

We wish to express our appreciation to the McGill Mfg. Co., Inc., and Mr. Bode, their production engineer, for the excellent help given in gathering the information for this story and—The United States Hoffman Machinery Corp., and P. C. Matthews, field engineer out of the Chicago office, for the data, pictures and other help provided.  
—Editor.

Fig. 8. Operation chart of flotation unit used by electrician who starts system at 6 a.m. and shuts it off at quitting time. Switch Numbers: 1, Driver Collector. — 2, Driver Skimmers. — 3, Rotor Motor. — 4, Rotor Pump. — 5, Clean Coolant Pump. — 6, Sump Tank Pump. — 7, Fuse Box.



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TOOL ROOM LATHES

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SHAPERS

12"-16"-20"-24"-30"

The various methods which are successfully employed by manufacturers to dispose of chips and scrap is discussed by the author. Air, conveyors, trucks, and magnetism, are some of the methods used in chip disposal. The necessity for recovering cutting oils from chips and some of the equipment used to accomplish this, is stressed.



*Handling  
and Processing  
Chips and Scrap*

.....

*By JOHN E. HYLER*



February, 1947

MACHINE TOOL BLUE BOOK

203

Formation of chips and scrap, at various metal-working machines, is an inevitable part of the metal-working process. Many times, metal cuttings get into working machine parts and cause trouble. Therefore, it is necessary to design machines protectively in this respect, as far as possible, and it is also needful that machine operators and maintenance men clean away all chips, from the exterior of machines, before exposing bearings, slides or other working parts. A good air gun, at the end of a compressed air hose, is excellent for this purpose. There are various guns available that are suited for this purpose. Under no circumstances, of course, should a blast of air be used for further cleaning after any working parts are exposed, since chips are liable to be blown directly into the mechanism.

The fact is that moving air is used in many different ways with reference to metal chips handling. One of these has reference to separation of chips from work pieces, especially in the case of screw machine products. There is a fanning mill, primarily designed for removing sawdust from tumbler charges of metal parts, but which has also proven practical for separating metal chips from screw machine products. The unit has an inclined hopper or tray at the top, into which the work, mixed with chips, is dumped. This hopper moves up and down with a jarring motion, and at the same time oscillates sideways, in such manner as to feed the work down an inclined, metal-lined chute. Enroute down the chute, the work comes into contact with an upwardly-directed blast of air. The current of air comes from an incorporated fan chamber, and the strength of it may be varied, through dampers, to suit the work in hand. It allows the screw machine products to pass, but blows the chips upward, into a bin or other suitable holder.

There, are, however, chip separators

specially designed to handle screw machine and similar work, which operate with even greater efficiency, though much on the same basis. Using one machine of this particular type, one operator can handle as much chip separation work as three men using riddles on screw machine products, or as much as six men who pick screw machine products from the chips. The chips are separated from the work with more than 99% efficiency.

An interesting aspect of screw machine chip separation is found in plants where Swiss type screw machines are employed for turning out very tiny parts, such as those used by watch, clock, instrument and optical manufacturers. On one separator, which has been used considerably for this purpose, there are facilities for using either a blast of air, to blow the chips from relatively heavy parts, or a suction arrangement, where chips are to be separated from parts that are very small and light. A larger chip separating machine, made by the same firm, will handle parts as small as  $\frac{1}{8}$ " diameter by  $3/16$ " long, or parts up to  $2\frac{1}{2}$ " diameter and  $4\frac{1}{2}$ " in length. This unit will also separate parts from long curled chips of steel, even when they are bunched together like hay.

It can be seen that the use of moving air has various applications in the moving and handling of chips and scrap. Another interesting aspect is that of using intermittent air blasts, especially in connection with punch presses and like machines. In some instances, such compressed air blasts are used to blow workpieces from dies, into tote pans or other containers, but they are also utilized for cleaning trimmings from dies, etc. We have seen some cases in which there was an air compression cylinder, arranged so that each downward thrust of the press ram would compress air in the cylinder, to be used for the type of duty cited. However, in most instances,

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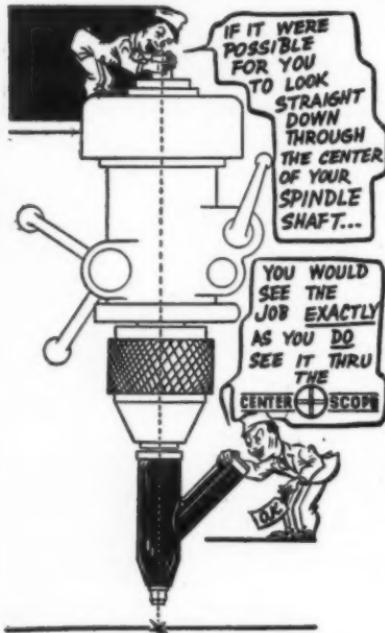
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compressed air for this purpose is taken from the shop air line. The press ram is made to operate an air valve, thus timing the resulting blast of air perfectly with the motion of the press ram, which timing is a necessary condition. There are different manufacturers that provide equipment applicable to presses for this purpose.

There are probably some who are not aware that pneumatic conveyors, of the same general type employed for collecting wood refuse, may be and are used in different cases for the collection and disposal of metal chips, in the form of turnings, borings, etc., as well as light metal scrap. The use of a pneumatic collecting system has the outstanding advantage that it removes chips from milling machines, drill presses, broaching machines, lathes, etc., immediately, and thereby prevents any bulky accumulation which is inconvenient in various ways. An interesting advantage of such systems is that excess heat or fumes can also be withdrawn, through the same system handling metal chips and light scrap, if desired. Further than this, air at considerable velocity is being continually drawn over the cutters of the machines served, providing a considerable amount of cooling for the cutters, which is definitely on the side of good practice.

Many of these systems have been installed which will remove three to four tons of metal chips and scrap per hour. Separators may or may not be used in such systems, but they are not necessary to the extent they are found in pneumatic collectors for wood refuse, due to the fact that only a nominal amount of dust is present in most instances. Delivery may be and often is to storage bins, pending processing of the chips in one way or another, and particularly with regard to later oil reclamation. However, there are also pneumatic systems employed to handle metal chips

after the oil has been removed from them, either to deliver them to a somewhat distant point for further processing, or directly into railroad cars. Whether a pneumatic metal chip handling system can or cannot be installed in any individual plant to real advantage is a matter for careful consideration, and depends on various attendant circumstances.

Whether a pneumatic system or some other means is employed for removing metal chips from machines, there are certain important factors that should

not be overlooked. One of these has reference to holding work on magnetic chucks. Such a chuck will impart magnetism to the ferrous workpiece, and unless it is demagnetized, chips will cling to it in further operations. It is especially important, that where magnetism has been imparted to any kind of metal-working cutters, while in process of manufacture, they should be thoroughly demagnetized, so chips will not cling to them and cause trouble. Demagnetizers are readily available from various sources.

• • •

**The little lady shown has no trouble at all, with the power lift truck on which she is seated, in tiering self-dumping hoppers three high in the manner shown, filled with metal turnings, borings, etc., pending the arrival of a motor truck which will haul the material away. Photograph courtesy of Yale & Towne Mfg. Co., Philadelphia, Pa.**

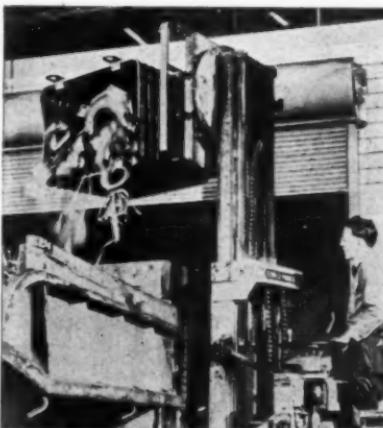


Very often, the design of a machine has much to do with proper chip handling. In the first place, it is an important point in good machine design to have the more important working parts of a machine located above the chip-production zone, if possible, so the chips will naturally drop away from them by gravity. In some instances this is not consistently possible. In others, it is. We think of a vertical design hobbing machine, arranged in such manner that the chips fall readily away from the working parts of the unit. We think of multiple spindle screw machines, with their drumshaft, cams, and related actuating mechanism located above the tooling area, so none of the chips produced can interfere. Where this cannot be done, working parts must be properly encased, or otherwise protected.

• • •

Shown here is the type of power lift truck mentioned in the text that has facilities for dumping boxes designed for use with it. This truck is designed with a head that can be rotated, and this head forms the mounting for the load-carrying forks. The boxes must be designed with holes in their base portion into which the truck forks can be run. Thus, the box is retained by the forks, when the latter is rotated to dump the box contents. The box shown here has already been rotated through 90 degrees from its original position, and dumping of the contents into the motor truck has begun. Photograph courtesy of Elwell-Parker Electric Company, Cleveland, Ohio.

However, we must note that some machines are designed with particular reference to easy removal of chips, for instance, highspeed metal cutoff saw, which has a drawer-type chip pan that can readily be removed, for periodical emptying. . . . or a huge broaching machine, (one of the largest vertical broaching machines ever built for spiral broaching) which is necessarily set into a pit in the floor, and which is equipped with an integral conveyor, for carrying chips out continuously, as they are formed. They may be isolated cases, but they still indicate that efficient methods of chip disposal from machines are being given increased attention by





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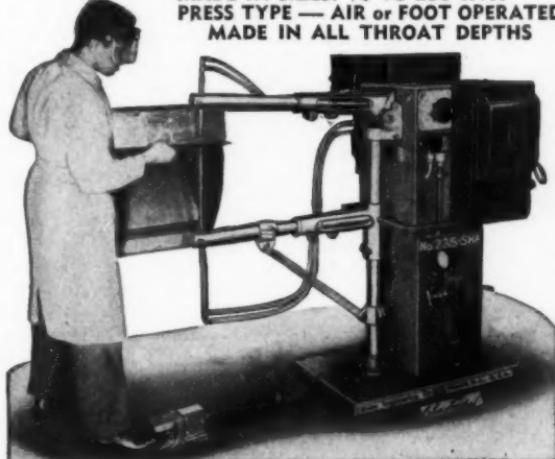
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machine designers.

Where machines are set into a pit, it is because they are so large that it is necessary to do this, to bring them down to comfortable working level. The under-floor idea also extends to the handling of chips in different ways. Under-floor conveyors have been used in large metal-working factories, for receiving chips from different machines as they are formed. In some instances, such a layout can be made to serve approximately the same purpose as the pneumatic systems earlier mentioned, and do it with equal or with greater facility, depending on circumstances.

In some instances, a large main chip disposal conveyor operates under the shop floor, and is fed by various shorter cross conveyors, which actually receive the chips from the machines. A good arrangement is to have the chip-receiving cross conveyors located at the rear of the machines, so the chips can be chuted into them from the machines without interfering with machine operators and their work. It is believed that any of the companies which specialize in installation of chain and cable flight or drag conveyors, can design and install a suitable system for this purpose. The cable conveyor is superior to the chain type, where it must operate over a long run or carry a heavy load, for there is much greater strength in a cable than in a chain.

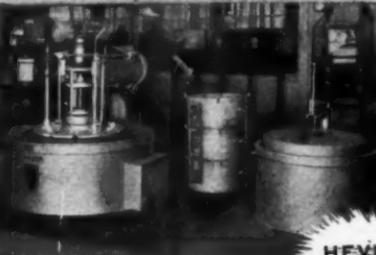
There are cases, of course, in which a suitable apron conveyor can be advantageously used in carrying away trimmings of steel, etc., which accumulate at blanking presses or at torch-cutting machines, and depositing such scrap at any predetermined disposal point. In fact, a good apron conveyor can be used for carrying practically any kind of metal scrap, including chips, turnings and borings. But there are various metal-working setups which do

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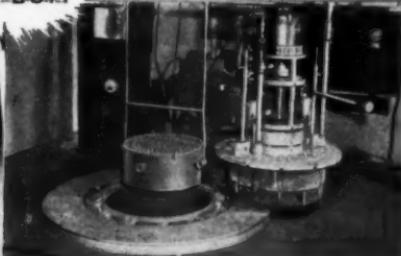


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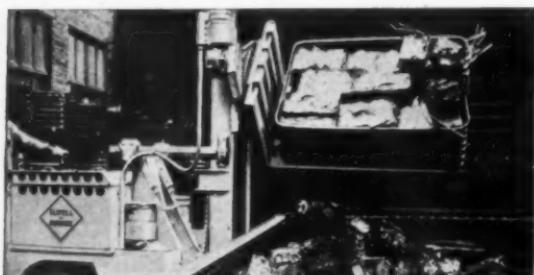
not use any kind of conveyor or pneumatic system, and yet deal very effectively with the removal and handling of metal chips.

One highly interesting method of keeping metal chips from under the feet of machine operators consists of providing pits in the floor, cubical in contour, and adjacent to given machines, which will hold steel boxes or similar units of special type. These boxes can be readily placed into and handled out of the pit by hoists on a shop monorail system, or on a shop crane. The arrangement is such that the top of the box is just slightly below the floor line in the pit, otherwise filling the pit quite snugly. Over this pit and its contained box is placed a strong metal grill, with sufficiently large openings to allow the chips to find their way thru and into the box, as they are pushed atop the grill.

There is a rabbeted recess in the floor around the pit, so the grill mentioned has its top lying flush with and forming a part of the shop floor, while it is in place. When the box is full of chips, the grill is lifted and set aside by the hoist; the box is lifted out and replaced by an empty, and the grill is then replaced. The filled box is then crane or monorail conveyed to a point of disposal, or, if it is properly designed, it can be carried away by means of a power lift truck.

Such trucks are being more and more freely employed in handling chips, bortings, turnings and other metal scrap in boxes. Sometimes, such boxes, filled with chips, are stacked in storage, pending final disposal or processing of the chips. In some instances, power lift trucks have been fitted with a rotary mechanism for their engaging fork, that allows boxes specially designed for use with them to be directly dumped into trucks or railroad cars, as the need may appear.

Dumping of scrap and similar materials into trucks, railroad cars and other disposal points, by means of power lift trucks, is also accomplished in some instances with the aid of self-dumping hoppers, which have been designed and built by some of the manufacturers of such trucks. These self-dumping hoppers very much resemble a box when closed, and have skid-type bottoms, so they can readily be handled with any lift truck. Hand lift trucks are quite often employed for transporting them to zone storage therefore, and from that point they are picked up by the power lift truck. There are also retaining flanges on such hoppers, making it possible to stack or tier them, by means of the power lift truck. So far as transportation is concerned, the power lift truck can and often does carry two of the hoppers at once, tho it can handle only one at a time for dumping.



Shown here is a picture of the special truck which will elevate and dump specially designed tote boxes, illustrating how this equipment can be used to advantage in handling and dumping bales of sheet metal scrap. Photograph courtesy of Elwell-Parker Electric Company, Cleveland, Ohio.

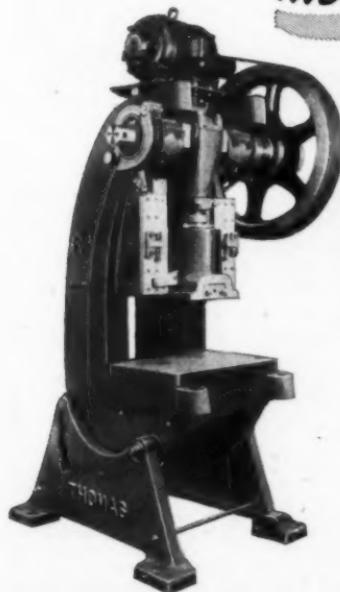
It was pointed out in preceding paragraphs that magnetism in parts and cutters is often a hindrance to proper release and handling of chips when working ferrous metals. On the other hand, magnetism certainly has its positive uses in regard to chips. For instance, there is a magnetic plug quite often used in the drain openings of different units, the function of which is to attract and hold any metal chips

which get into a crankcase, or other place where lubricant is enclosed. This type of plug can be obtained in a range of sizes to fit any drain opening. It has a core which is a powerful permanent magnet, guaranteed to remain magnetically active for ten years. Without question, this device has lengthened the life of many a mechanism to a very considerable extent

Magnetism is also highly useful in

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separating different kinds of metal chips, especially where part of them are ferrous, and part are non-ferrous. Different manufacturers of magnetic separators have devised and built machines suited for such duty. One unit which has major adaptability for separating metal borings and turnings, to reclaim brass, bronze or aluminum from ferrous chips, is provided with a hopper. The hopper is at a convenient height for shoveling in chips. The material feeds from the hopper in an adjustable stream, to strike a revolving drum at an angle.

This drum revolves with part of its periphery in a magnetic field. Ferrous or magnetic particles adhere to the drum as they strike it, while other materials bound off and fall in a stream into a container at the front of the unit. The magnetic particles continue to adhere to the drum until they reach a point where it leaves the magnetic field.

They drop into a different container, at the point where they emerge from the magnetic field. Another and different type of magnetic chip separator, which we cannot describe here, was developed for separating babbitt from oily chips, after a connecting rod broaching operation.

For various good reasons, many firms having a considerable accumulation of metal turnings run them thru a special crusher, reducing them to chip form. Metal turnings crushers are provided by different builders, and have variations in design, particularly with reference to the actual crushing elements. One metal turnings crusher has been observed that has manganese-steel tooled rings, which do the actual crushing of the turnings. These toothed rings swing on pins, at the ends of rotating arms, the pins being placed through the bore of the rings. However, the bore of the rings is quite a bit larger than the diameter of the pins on which they are mounted. This allows the rings to retract in any necessary degree, to pass over any obstructions which they cannot break.

The turnings are put into a hopper at the top, and feed down under the pulling action of the toothed rings, against a manganese-steel breaker plate. The crushed turnings drop thru grates in the bottom section, for delivery to a bin or conveyor, as the case may be. Any pieces of tramp iron too large for

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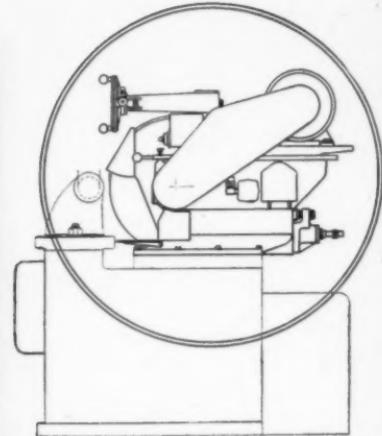
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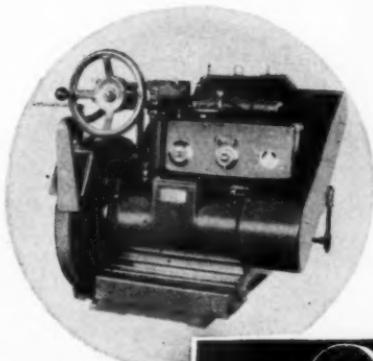
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the toothed rings to reduce are automatically moved up over the grates to a spring-backed and weighted apron at the front, where they are forced from the housing.

Crushers for turnings made by others have much the same general design, so far as the top hopper and the grate section below are concerned, but some of them have so-called clover-leaf crushing elements instead of rings, and some have swinging teeth, or hammers. Both the hammers and the cloverleaf crushing elements are designed in such manner that they can retract, if and as the need may appear, and are only held to their outer operating position by means of centrifugal force.

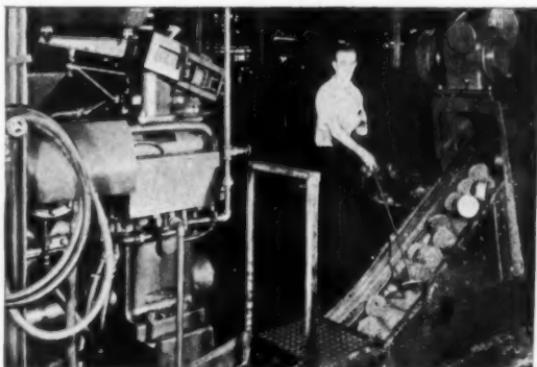
Among different reasons for reducing bulky turnings and similar material to chips, in the manner cited, is the fact that uniformly-sized chips are preferred on the market, and therefore command a better price. Chips are more readily handled, for they can very readily be shoveled, and may be carried on certain types of conveyors with less difficulty. Chips are much better for storage and for shipping, because the volume of a given amount by weight is greatly reduced. Thus, a great deal more tonnage can be shipped in a car, and a great deal more can be stored in any given

bin. Another very interesting proposition is that chips can be much more readily handled at a chip wringer. The oil or cutting compound is also more readily reclaimed.

The recovery of cutting oil from chips, before processing them further, is a very important proposition in plants where they are produced in volume. Removal of cutting oil from chips reduces the fire hazard, for the oil can then immediately be placed in safe containers. Prior removal of the oil also simplifies the separation of ferrous from non-ferrous chips. The modern method of oil removal, of course, is the use of a centrifugal chip wringer for the purpose. This is so much more efficient than mere draining of the oil from chips by gravity, that there can be no comparison. When the highest practical degree of centrifugal force is used for this purpose, it is hundreds of times as powerful as gravity. Chip wringers are available in various sizes, from different sources, so that one can always obtain the correct chip wringing capacity for any plant. It is always best to use the largest practical machine of this type in any given plant, for there is less fuss and handling involved with a given amount of chips, where a larger-diameter chip wringer is employed.

It is important to reclaim oil from

Shown here is an illustration of briquettes of steel chips and cast iron borings proceeding through a chute of a briquetting machine. Vibrating electric feeders are preferred equipment for feeding the loose chips to such a briquetting machine. Photograph courtesy of Jeffrey Mfg. Co., Columbus, Ohio.



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chips as thoroly as possible, for more than one reason. First and foremost is the value of the oil itself. Depending on the type of work and the amount of coolant used, cutting oil recovery thru the use of centrifugal chip wringers may run anywhere from 10 to 30 gallons or more from each 1,000 pounds of chips processed. This results in having a plentiful supply of reclaimed cutting oil on hand, and tends to make operators

• • •

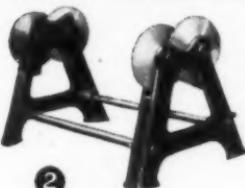
Shown here is a special dumping stacker used for handling steel bales. The dumping action is automatic when the bale reaches the top point of travel. The stacker is of telescopic type. After dumping the bale, the platform automatically returns to the lower position to receive and elevate another. Photograph courtesy of Lewis-Shepard Sales Corporation, Watertown, Mass.



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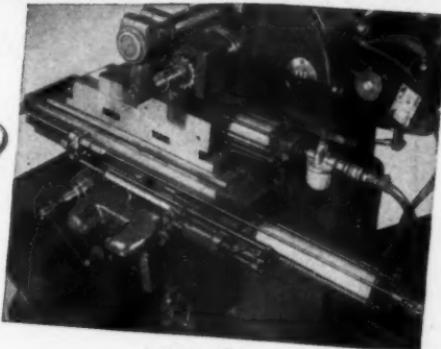
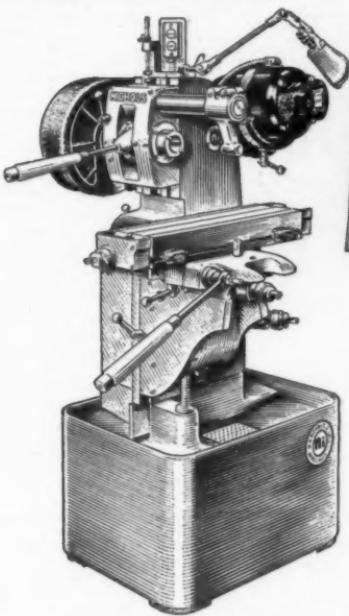
In shops where no attempt is made to reclaim cutting oil, it is the general tendency to get everything possible out of each lot of clean cutting oil. It follows that in many instances, the oil becomes quite heavily charged with fine particles of metal, which have an abrasive effect on cutting tools. It is not at all uncommon to find tool wear greatly reduced in plants which have just installed centrifugal chip wringing equipment. Thus, tools require less attention, and there are fewer interruptions to production in many instances.

In plants where a centrifugal chip wringer is kept quite busy, it is good practice to have two baskets for the machine, so that one basket can be in process of loading with oily chips, while the other is spinning in the machine, thus saving much time. Some of the best of these machines are so designed that the case covers are interlocked with the source of power, electrically. Thus arranged, it is not possible to start the machine before the cover is closed, and neither is it possible to open the cover while the machine is running. This makes the unit foolproof, and provides perfect safety.

Chips are practically always bound for the melting furnace ultimately. Before being re-melted, it is customary to wash, rinse and dry them, in order that all remaining traces of cutting oil, grease and organic matter may be removed. The presence of any foreign matter on the chips might otherwise affect the balance of the alloy being prepared, or might deteriorate the electric elements in the melting furnace. Special machines have been developed by different builders for washing, rinsing and drying chips. These practically always have a hopper, for feeding the material, and means for applying a cleaning solution,

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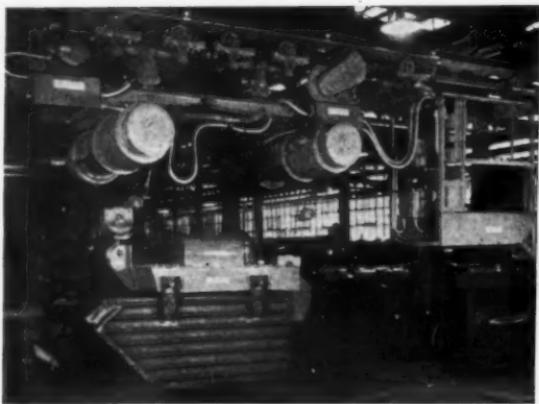


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Here is shown an illustration of a special monorail carrier, cab-controlled, which is equipped with two separate hoists to lift, stack, carry or dump special spout-front tote boxes. The special grab suspended from the two hoists is provided with four motor-operated latch pins. When the grab is lowered to place over a tote box, the motor causes the pins to move outwardly, and thus engage the four lugs, two of which can be plainly seen. Photograph courtesy of Cleveland Tramrail Division of the Cleveland Crane & Engineering Company, Wickliffe, O.

then rinsing water, in addition to a suitable heat source for drying.

Some of these machines have exhaust ducts, for drawing off any vapor, and thus speeding the process. One such machine, after removing the chips from a washing drum, traverses them up an inclined screw conveyor, so they can drain enroute, before depositing them into the rinsing tank. A conveyor removes the chips from the rinse tank, drains them, and carries them into a drying drum. As the chips traverse the drying drum, they are continually tossed into the air, to prevent their bunching up, thereby enhancing and speeding the drying action. The more the drying drum is inclined, the longer it requires for the chips to pass thru. The inclination of the drum is adjustable, thereby permitting the operator to regulate the drying time.

It is pretty well known that metal chips are often briquetted. There are two reasons for this. One of these is the fact that briquettes are more easily handled. The other is that less of the metal is vaporized at the melting furnace, when it is first briquetted; more of

it therefore going into the actual melt. Briquetting machines designed for cast iron chips, steel turnings, and non-ferrous materials, are provided by different builders, some of them working automatically and continuously, as chips are fed continuously to them. The feeding may be accomplished in different ways, but the use of the electric vibrating feeder, for providing a stream of cast iron and steel chips, is really well established. Such a feeder provides a means of discharging a uniform feed to the briquetting machine, and this uniform feed is really essential for maximum output. A vibrating feeder never allows any hopper hang-ups or bridging to occur, but handles this material with ease.

Different methods of handling sheet metal scrap can be employed, but in many places, where it must be handled in quantity, it is found best to bale it. Baled sheet metal scrap has advantages similar to briquetted chips. In some plants where there are many trimming presses, the trimmings are thrown into easy-dumping buggies or wheelbarrows, as they accumulate. As soon as these fill,

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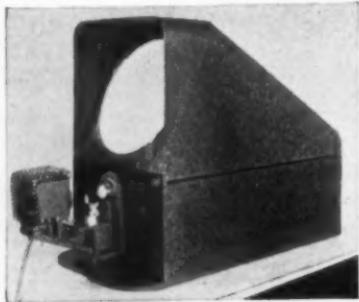
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they are wheeled to a dump hopper, often below floor level, into which they can readily be dumped. This hopper either serves a baler on the floor below, or is closely adjacent to one. There are different firms that provide baling presses suitable for use in baling scrap metal, and bales produced in different places have different weights. Some of them weigh less than 150 pounds, and some have been noted that weigh around 500 pounds. Once formed, such bales may be handled on apron conveyors, with a magnet, or in other convenient manner. At the steel mills, lifting magnets are widely used for handling all kinds of ferrous scrap.

There are always instances in which magnets cannot conveniently be used. This has led to some out-of-the-ordinary developments for handling steel bales. One of these is a special telescoping stacker, with a platform that elevates a steel bale up to a considerable height, and then tilts to dump it. After dumping slowly, on release check control, the stacker platform automatically returns to the lower level, to receive and elevate another bale. It should also be noted that some of the special lift trucks, referred to in the preceding article, can be advantageously used for handling and dumping steel bales into storage, into railroad cars, etc.

It might be mentioned that metal scrap of the stringy variety is sometimes rolled into the form of compact cylinders, by means of special machines that have been developed for this purpose. Winding usually takes place on the tapered portion of a horizontal spindle, which revolves in a compartment designed to receive and wind the scrap. As the winding proceeds, a weighted roller (which lies in vertical slots in the winding compartment) rides and rolls on top of the scrap, to compact it, as the spindle rotates. After a bundle has been properly wound and

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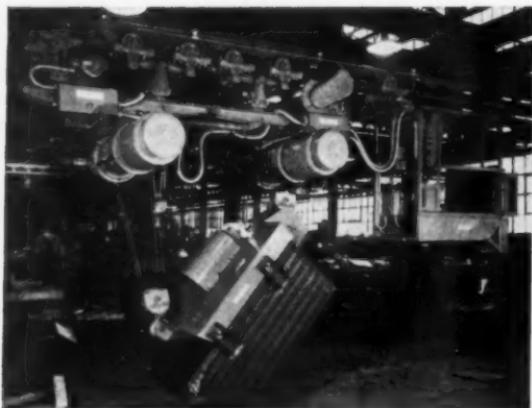
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This is another illustration of the special dual-hoist monorail carrier layout, which plainly reveals the method of dumping. There being separate hoisting and lowering control of the two hoists, when desired, the forward hoist is lowered while the rear one remains elevated, thus tilting the spout nose of the box downward, and dumping the charge. A layout like this is in use for dumping scrap directly into the cupola in at least one plant. Photograph courtesy of Cleveland Tramrail Division of the Cleveland Crane & Engineering Company, Wickliffe, Ohio.

compacted, the spindle being tapered, can be readily withdrawn, the bundle removed, and the machine made ready for repeating the cycle.

There is the aspect of scrap metal reclaimed from many items that go to the junk yard, which we have not considered. This is largely handled by magnets and grapples in different places, the special means of handling are often adopted at the plants where such material is re-melted. An interesting case in point is the use of special fabricated tote boxes, provided with a spout-type nose for ready pouring, and arranged

for handling with a special monorail carrier. Metal scrap of heavy types is handled in these tote boxes with a dual hoist arrangement on the monorail carrier cited. The boxes can be picked up and set down at any point, can be stacked six or seven high, or can be dumped directly into the cupola. To dump a box, all that is necessary is to lower with both hoists until the tote box is down to a point just above the required dumping position. From that point, only the forward hoist, supporting the spout-type end of the box is lowered, thus pouring out the contents.

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We fully realize there is much more that might be said about handling and processing of scrap, but it is hoped that what has been set forth here will prove of interest, and that it will be helpful in meeting the scrap handling problems of many readers. It is possible that we shall see further advances along these lines in years to come. Until then, it behooves us to give careful study to methods available, and check them against methods being used in the individual plant.



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**No. 18  
DRILLS**

# Radio-Frequency Heating

## What It Is And How It Works

by

**B. E. Rector**

Electronics Engineer, Industry Engineering Department, Westinghouse Electric Corp.

From limited use a few years ago, radio frequency heating has spread today to many fields of industry, such as plastics, rubber, wood, food, textile, and paper. In the field of metal working it is used for soldering, brazing, annealing and hardening. The variety of applications and the number of installations are growing steadily, and will increase more rapidly as men in various industries come to realize its possibilities and become more familiar with its basic principles.

### Frequencies from 200,000 Cycles

According to common usage, Radio Frequency Heating implies the use of alternating currents ranging from 200,000 cycles a second up to hundreds of millions of cycles a second. Or, to use the "shorthand" of the trade, from 200 kilocycles (kc) up to hundreds of megacycles (mc), for one kilocycle equals 1,000 cycles, and one megacycle equals 1,000,000 cycles. The term "high frequency heating" is more loosely used, to include not only these frequencies but also frequencies from 180 cycles to 200,000 cycles. Figure 2 shows the R-F heating spectrum.

### R-F Generators

Power for high frequency heating in the 180 to 200,000 cycle range is usually furnished by motor generator frequency changers or spark gap generators. For most radio frequency heating applications, power is supplied by vacuum tube generators. This is the device with which we are concerned here, for it is primarily responsible for most of the revolutionary advances in modern heating technology.

The principle structural elements of radio frequency generators are (1) an electronic rectifier, which takes the incoming a-c power and delivers a suitable high voltage direct current, and (2) oscillator tubes and associated circuit elements which change the direct current to alternating current of the desired radio frequency. In addition there are coils or electrodes for applying the radio frequency current to the work in such a way as to produce the desired heating effect, and also various associated control devices.

### Like Radio Transmitter

The generating equipment has essentially the same function as, and bears a

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**A Non-Technical Explanation of the Basic Principles of Induction and Dielectric Heating. Some interesting applications of this heating method are described by the author.**

---

close resemblance to, the transmitting unit of a radio broadcasting station. In fact, much of the early experimental work in R-F heating was done with regular broadcasting equipment. Because of the experience gained in broadcasting, the actual generation of R-F power for heating has been a lesser problem, and engineers have been able to concentrate on the many new problems involved in the precise heating of workpieces of a wide variety of shapes, sizes and materials.

Two\* fundamentally distinct methods

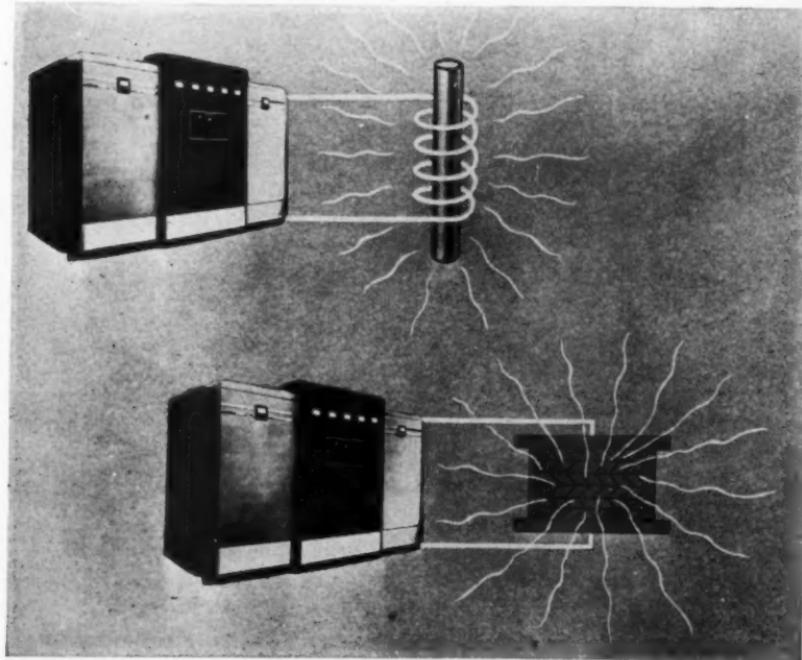
of applying R-F power are employed—**by induction** when the workpiece is of a material which is a conductor of electricity, and **dielectrically**, when the workpiece is a non-conductor (dielectric). The two methods are shown diagrammatically in Figure 1.

#### Induction Heating

The phenomenon of induction is fa-

\*A third method of application is introduced with the development of micro-wave power.

**Fig. 1. Upper Diagram: R-F energy transmitted through the coil induces a similar current in the rod (workpiece). Heat results from resistance of the workpiece. Lower Diagram: Workpiece is a non-conductor (dielectric) between two electrodes. R-F energy in electrodes sets molecules of workpiece in motion, generating heat.**



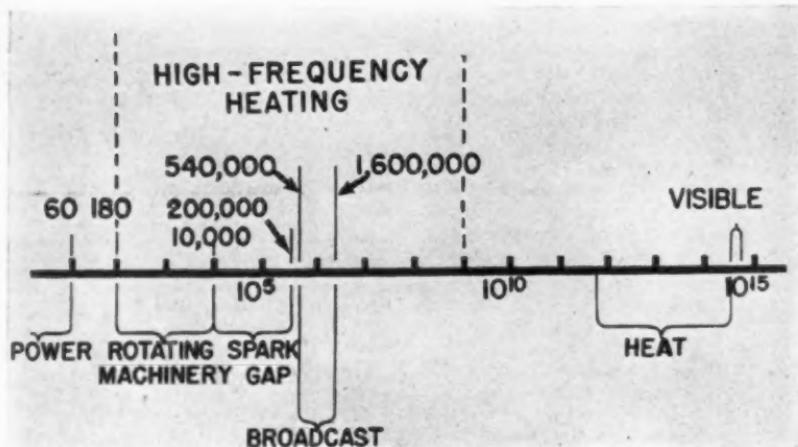


Fig. 2. Frequency Spectrum. Frequencies for R-F heating begin at 200,000 cycles per second; extend well into millions of cycles per second.

miliar to everyone who has an elementary knowledge of electricity. We know that when an electric current flows through a conductor, a magnetic field is set up around it, and that if the current is alternating, the magnetic field is constantly changing. We know that if a second conductor is brought within this changing field, a voltage will be induced in this conductor, and a current will be forced to flow in it also.

We know, too, that whenever there is

a flow of electricity in a conductor there is also resistance, and the energy necessary to overcome this resistance appears as heat.

These facts were utilized in the induction furnace, which is now an established method of melting metal or heating it for forging. The induction furnace, however, uses comparatively low frequencies, and does not come under the head of R-F heating.

#### "Skin Effect"

Radio frequency induction heating in-

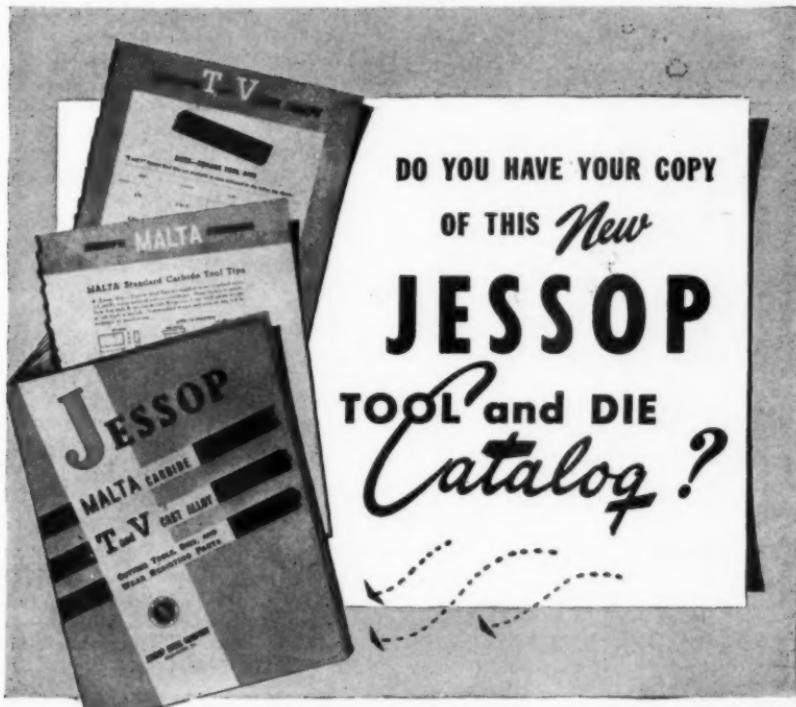


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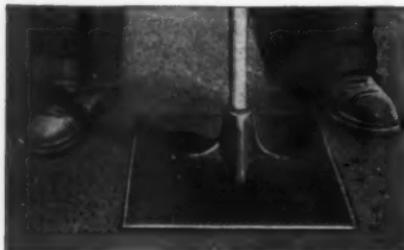


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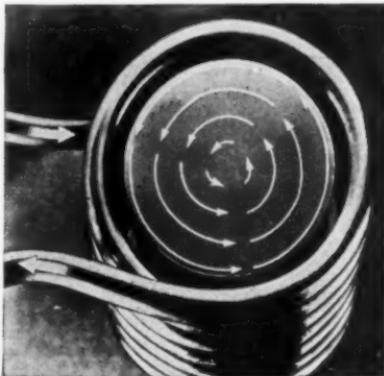
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volves the utilization of still another characteristic of electricity. When we are dealing with direct current or with low frequency alternating current, the current flow is substantially the same at the center of the conductor as at its surface. As the frequency increases the current tends to be crowded to the outside of the conductor. When we get to a few hundred thousand cycles per second, virtually all of the current crowds to the surface, as shown in Figure 3.

This phenomenon, known as "skin effect" is a vitally important characteristic of R-F induction heating, because it permits sharp concentration of heat at the surface of the workpiece. Further, since the depth to which the current can penetrate is determined in part by the frequency of the applied voltage, we can control this depth very precisely.

The advantage of precise depth control is shown in such applications as shaft hardening, shown in Fig. 4. Here the bearing surface must be made as hard as possible, but the core of the shaft must remain tough and resilient.

Fig. 3. Low frequency current is distributed evenly throughout conducting material, but high frequency current crowds to the outer surface of the material.





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The problem is to heat the surface to a predetermined depth and temperature, so quickly that little heat is transferred to the interior of the shaft.

For the induction heating engineer, this problem is simple. The shaft is properly positioned within the inductor coil of a radio frequency heater, current is passed through it, and the surface metal becomes red hot over the desired area so quickly that the heat has no time to wander off where it might do harm instead of good. When the correct hardening temperature is reached, the power is automatically shut off and the hot surface quenched in water or oil.

#### Depth Control

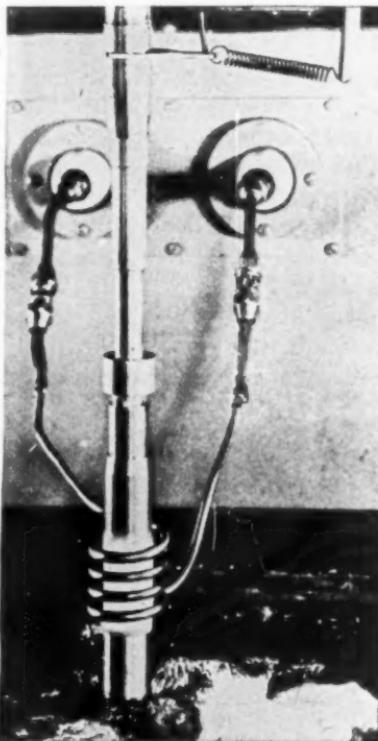
Shaft hardening and similar operations can also be performed by passing the shaft through a coil at a uniform rate of speed, such that the time of passage through the coil is just enough to allow the shaft's surface to reach the correct hardening temperature. The

piece is automatically quenched by sprays of water from nozzles just below the inductor coil.

Contour-hardening, as in Figure 5, is another case in which R-F induction heating, with its precise depth control, is of great value. Only a gear's surface is hard—the unheated core still retains the desired toughness and elasticity. Still another application is the hardening of internal bearing surfaces—almost

• • •

**Fig. 4. Shaft Hardening.** Shaft is passed through the work coil at a predetermined speed. At the right instant, the power is automatically shut off and the shaft drops into the quench.



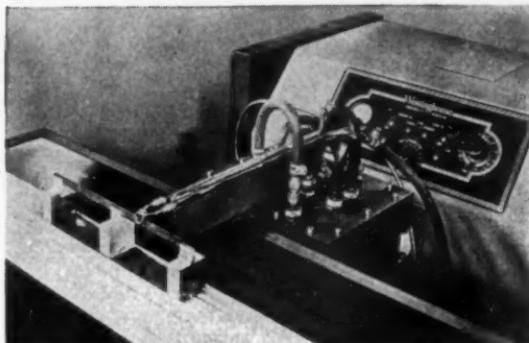
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Fig. 5. Hack saw blades, mounted as shown, are carried on a conveyor belt so that teeth pass through the work coil. Hardening becomes a "production line" process; the operator's only task is to put the blades in place and to remove them.



impossible by any other method, but extremely easy with R-F induction heating.

#### Area Control

A second advantage of R-F heating is its precise area control. In the assembly shown in Figure 6, for example, a cover plate is brazed onto a tube without

affecting another brazed joint only a quarter of an inch away. Localized hardening or annealing of small parts is also accomplished easily by induction heating.

#### "Production Line" Methods

Finally, induction heating lends itself readily to the "production line" method



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of manufacture. There are many applications, like the brazing operation in Figure 7, in which parts to be heated can be carried through the inductor coils on conveyor belts or other feeding devices. Control of time and temperature is automatic; relatively unskilled labor can be taught to do various jobs better and more rapidly than they were done by highly skilled men under former methods.

#### Dielectric Heating

Dielectric heating, which got off to a slower start, is now running a close second to induction heating in the radio frequency field. Though the generating equipment for this type of heating is essentially the same as for induction heating, it poses some more difficult problems. We are no longer dealing with frequencies of several hundred thousand cycles a second, but with millions of cycles. Before the war, such frequencies would have been out of the question for industrial use, but the accelerated pace of wartime developments in short wave radio makes them practicable today.

The method of applying this very high frequency power is based on the principle of the condenser or, more properly, the capacitor. Broadly speak-

ing, any pair of conductors separated by an insulating material constitute a capacitor. In dielectric heating, the conductors are a pair of metal plates called electrodes; the piece to be heated—which must be a material which is normally an insulator—is placed between them.

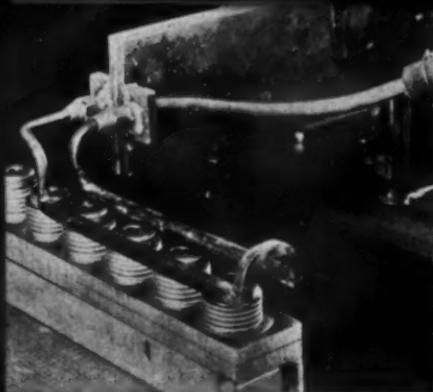
In radio and power work, capacitors have a number of functions, but the function of this capacitor is based on a characteristic which is definitely undesirable in other applications. That is the tendency of the insulating substance or dielectric to become hot when an alternating electric potential is applied to the electrodes.

Here, figuratively speaking, is what happens in a microscopically small section of the material being heated when a rapidly alternating voltage is applied to the electrodes. Because of the electrical charges within the molecules the rapid changes of polarity on the electrodes tend to make the molecules vibrate. The more rapid the reversal—that is, the greater the frequency—the more rapid is the vibration. This molecular motion produces heat.

One noteworthy characteristic of dielectric heating is the uniformity of molecular agitation throughout the dielectric. Molecules in the middle of the

Fig. 6. Brazing the cover plate on this tube by conventional methods would have damaged the joint at the right. Induction heating accomplished it without difficulty, and in considerably less time.





**Fig. 7. Brazing is another process which can be put on an assembly line basis. These pieces are automatically brazed as a conveyor belt carries them through the work coil.**

workpiece are shaken back and forth by the alternating field just as hard and just as fast as they are anywhere else. Hence, there is no overheating at the surface and no underheating at the center.

The amount of heat procured by this molecular vibration is proportional to the frequency, since this determines the number of vibrations per unit of time; to the square of the applied voltage, since this voltage determines the amplitude of the vibrations; and to the "loss factor," which is a way of expressing the fact that different materials have naturally different rates of heating.



**Fig. 8. Dielectric heating of preforms has cut time and cost of molded plastics and has improved the quality of the product. Press wear is also greatly reduced.**

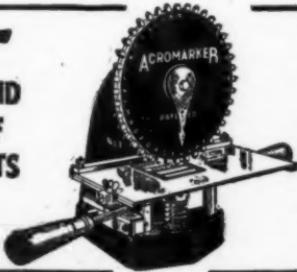
The speed, convenience, and uniformity of dielectric heating have led to its use in such applications as the preheating of plastic preforms before molding, as in Figure 8, where it has resulted in reducing molding time, improving the finished product, and cutting mold costs.

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ly be made with these binders was about one inch. With dielectric heating, however, thickness doesn't matter, since heat is generated within the material itself and does not have to seep in from the surface. Consequently plywood can now be made with phenolic resin adhesive comprising as many as 148 layers of birch veneer and measuring over a foot thick. Multi-layer plywoods cured dielectrically have demonstrated a tensile strength of 15,000 pounds per square inch—but are only half the weight of aluminum.

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By  
**WARREN BAKER**

## Section II — Instrument Inspection, Cont'd.

### Part 8 — Inspection of Height Gage and Solid Square

Height gages are ordinarily of two varieties, the scaled type used for actual measurement of a distance above a base, and the transfer type which may or may not be scaled and which is used to transfer measurements from a standard, such as a stack of gage blocks, to a piece part or vice versa. In either case the measurements should always be made from some flat surface, preferably a surface plate or a toolmaker's flat. Most distance and location gages are variations of the same idea.

Inspection of the scaled type height gages is accomplished by the same general methods as outlined in the last installment for the vernier caliper, except in this case measurements are made from the bottom of the base, or the surface of the flat it rests upon. If the gage has two scales, as many of them have, the one starting with zero is measured from the top of the base block, while the one starting with a 1 inch line (Fig. 1) is measured from the bottom of the base block. In other words, most bases are 1 inch thick and many are ground so that either the top or bottom surface of the block can be used as a point from which to locate measure-

ments. Measurements are made between the base and the movable jaw, which may or not be equipped with a vernier adjustment. Some height gages have their first scale graduation at some other point than zero or 1. This results from the location of the vernier.

By the methods detailed in Part 7, measure the inches of the scale with gage blocks in a holder and determine the accuracy or lack of it in the scale itself. It will be necessary to use a caliper bar facing in on the left end of your gage block stack to measure from the bottom of the base block and a caliper bar facing out to measure from the top surface of the base block. The movable jaw should come snugly down to the top of the base block, with no light showing between them, when the graduation line is on zero on the one scale or on the 1 inch line on the other scale.

If light shows between the jaw and the top of the block, the face of the jaw may have been worn or sprung. The value of the instrument usually determines whether to repair or replace it. The jaw can be built up by welding or hard facing, then ground back to

size and flatness, if the jaw is at fault. Further tests are necessary to determine this, however, as will be shown shortly.

Having measured the first inch by this method the next step is to measure the rest of the inches in the scale. This, again, is done as detailed before, the total of the 10 inches (most double purpose height gages measure to 10 or 12 inches) being set down, then the inch by inch measurements taken and totaled. Errors, cumulative or individual, will be found in this way and the tolerances prevailing in your shop for this class of instruments will determine your disposition of the tool.

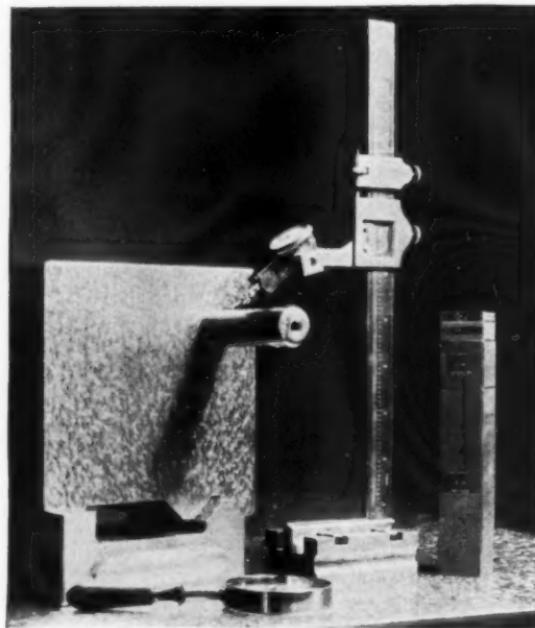
#### Tests for Flatness.

One more thing the inspector must determine in his routine check of height gages is the flatness or lack of it of the

base itself. This is most easily done by placing a straight edge across the base (turned upside down, of course) and see whether any light is visible between the base and the straight edge. If not, turn the straight edge the other way across the block. In both cases the straight edge should be moved the full length or width of the block, with a good strong light behind it. It sometimes is advisable also to move the straight edge diagonally, from corner to corner of the block, and make the same test.

A still more accurate test for flatness of the base is done with the aid of the cylindrical square (Fig. 2). The base is turned on its edge, with the flat side against the side of the square, again with a strong light behind the setup. If the base is flat, no light will show

Fig. 1—A typical height gage with scale and vernier adjustment. Note that the regular 1-inch base has been placed in a larger special base for rigidity. The gage is here being used as a transfer instrument, with dial gage replacing the usual caliper bar. (Courtesy Pratt & Whitney Division, Niles-Bement-Pond Co.)



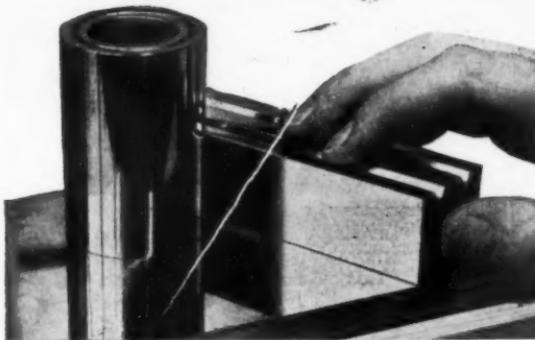


Fig. 2—Testing a comparator anvil for flatness with the cylindrical square. The same method can be used to test the base of the height gage.

between base and square as the base is moved its full length. If light shows only at the sides of the base, it still may be passed, but if light shows halfway or more down one side of the base, or if the band grows or varies perceptibly with the movement the base is not flat and will not give an accurate measurement.

It is rare that the base of the height gage will be sprung from rough handling, but it may be warped from lack of stabilization in the metal of which it's made and such bases are quite often worn out of size or flatness from being used to measure parts on

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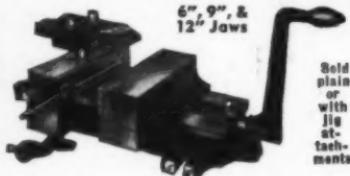
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machines especially where an abrasive is present, as in use on surface and profile grinders and the like. So, if the gage has a top measuring surface on which the movable jaw closes this must also be inspected. It was stated a moment ago that if the movable jaw does not close so no light is seen when the vernier is set on the zero line of the scale (or on the 1 inch line in the case of single scaled height gages) that the movable jaw may be worn or sprung. This is not always the case, although it is likely to be inasmuch as wear on the top measuring surface of the base is rather uncommon.

To check the top surface the first step is to set up a one-inch "snap gage" with gage blocks in a holder and with caliper bars facing in on each end. The base should then be placed within this gage and tested for thickness. If it is less than 1 inch thick, there has been wear either on the top or bottom measuring surfaces. If your previous test of the first inch of the scale proved it accurate, the wear has been on the top surface. Failure of the movable jaw to shut out light also proves that this is the case and if the band of light that shows is approximately the same width all the way across the movable jaw, the indication is that the wear is only on the top measuring surface of the base and not on the edge of the movable jaw. This is a rare occurrence, however, and the tests should be repeated until there is no room for doubt before the gage is discarded or the top surface is built up and reground back to size. Usually the wear will be either on the bottom of the base or on the blade of the movable jaw.

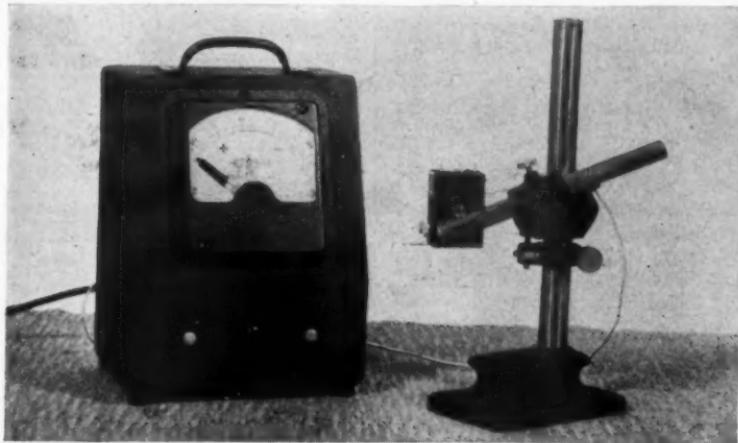
The top surface of the base also should be parallel with the bottom. A practical test, although not a very scientific one, is to run the 1 inch snap gage built up to measure the thickness all the way around the block. If it moves with equal freedom at all points,

I.e., does not "stick" anywhere, it can be assumed, with this class of instruments, that the surfaces are parallel. Better methods of determining parallelism with optical flats will be given in detail in the section on inspecting gage blocks and other instruments supposed to have absolutely parallel surfaces.

#### Determining Perpendicularity.

Scaled height gages, particularly if they are to be used for direct measurement and not as transfer instruments, must have their columns perpendicular to their bases. The same holds true, but in lesser degree, for transfer gages (Fig. 3). With the transfer type it is not so important so long as the gage is used in the same relationship each time; that is, for instance, if the measurement is taken with the front of the base block pointing toward the stack of gage blocks, the measurement must be taken with the front of the base block pointing toward the piece part when the dimension is transferred (Fig. 4).

Fig. 3—An electrolimit height gage. This type has no scale on the column, but is used as a transfer gage or comparator. (Courtesy Pratt & Whitney Division, Niles-Bement-Pond Co.)



There are several methods of determining perpendicularity and the one the inspector will use likely will be determined by the equipment he has available. The tolerances allowed in his shop also enters into the matter. Although height gages are seldom used for the exceedingly close work demanded in the tool inspection laboratory and if they are, they usually are used as transfer gages rather than instruments of direct measurement, thus making the matter of perpendicularity one of lesser moment, the method of determining perpendicularity with these instruments is the same as with some others where its importance is great. Therefore the methods will be given in detail at this time and applied later to the other tools.

Unless the height gage has been dropped and the column twisted, or has fallen into a machine on which it was used to measure a production piece, there is little likelihood that the measuring column will be out of perpendicular as regards its edge, which is the im-

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portant dimension. Height gages are made with the edge facing the work, so that the full width of the column blade serves to strengthen it and hold it rigid. Also there is little likelihood for uneven wear up and down the column edge. Therefore, if it turns out to be at some angle other than 90° with the base, it is probable, barring accident as mentioned, that it was purchased that way. Standard height gages, produced by standard instrument and tool manufacturers, are made to accuracies of about 0.0005" per inch of column length.

The procedure to be followed is this: Set up the height gage in question on a master flat, or if there is not room, on a surface plate of known accuracy. Set the movable jaw at any convenient point for the moment. If the jaw is very short, clamp onto its measuring edge a 4 or 6 inch caliper bar, facing up.

Then set up a second height gage, made from gage blocks, holder, base block, and a 0.0001" dial gage. The setup of this test instrument was shown in Fig. 4, although it is being used there for another purpose. Put this height gage on the same surface plate with the one under inspection, set it at any convenient height, say 6 inches, and bring the movable jaw of the doubtful one into contact with it, until the end of the caliper bar presses on the anvil of the dial gage and the dial reads zero. This measurement should be taken as near the end of the caliper bar as possible.

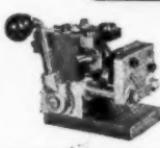
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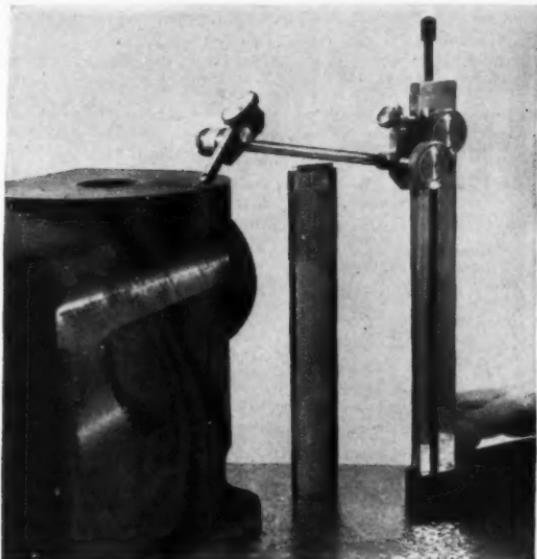


Fig. 4—Another variety of transfer gage, fitted with dial indicator. It is used here to check a piece part.

at 6 inches, that is your first measurement,  $h_1$ . Then slide the test gage with the anvil of the dial gage still resting in the caliper bar, along the caliper bar for any given number of inches, say 3. Read the dial gage at that point and subtract or add this reading to the figure  $h_1$ , depending on whether the reading is plus or minus. This dimension then is  $h_2$ . Then from this formula

$$\frac{h_1 - h_2}{L} = \text{sine of error}$$

where  $L$  is the distance along the caliper bar between height readings, you can determine the amount the height gage column is out of perpendicular. To explain the process in greater detail, let us use actual figures:

We will suppose that  $h_1$  was 6 inches as suggested. (And remember that this

is only 5 inches above the height gage base. This will be important later.) Then we will suppose that reading  $h_2$  was made at a point along the caliper bar 3 inches back toward the column, again as suggested.  $L$ , then, is 3. We will suppose that the dial gage at the second reading had dropped off 0.0045 into the minus quadrant. The  $h_2$  reading, then, is  $6 - 0.0045 = 5.9955"$ . Substituting in the formula, we get

$$\frac{6 - 5.9955}{3} = \frac{0.0045}{3} = 0.0015$$

The natural sine of the error, then, is 0.0015. From standard sine tables, this is found to be the sine of an angle of  $5'10"$ . Since  $h_2$  was less than  $h_1$ , the mathematical sign of the error was positive; therefore the error is added to  $90^\circ$  to arrive at the amount the column

is out of perpendicular. In other words, the height gage column extends into the positive quadrant 5 minutes and 10 seconds, making an angle of  $90^\circ 5' 10''$  with the base.

Had the  $h_2$  reading been greater than  $h_1$ , the mathematical sign would have been negative, indicating that the height gage column was leaning forward, and the error would be subtracted from  $90^\circ$ . The angle then, between column and base would have been  $89^\circ 54' 50''$ .

Now, since the total error in 5 inches of column length (remember the first inch is the thickness of the base) is  $5' 10''$ , the error per inch is  $1' 2''$ . Gage maker's tolerance in most of these instruments is only  $0.0005''$  per inch. The natural sine of 1 second of arc at a radius of 1 inch is about 4 micro-inches ( $0.000004''$ ). Tolerance is 125 seconds or roughly 2 minutes per inch. The error in this case is only about half the manufacturer's tolerance per inch. The

height gage has not been damaged or worn.

The careful reader will have observed that shortcuts can be taken in much of the above. The use of the dial gage on the inspector's height gage setup makes some of them possible. The reason the whole thing was worked out step by step in the foregoing was to make the method understood so that it could be applied. For instance, once the sign has been established, all that is necessary is to divide the amount of dial gage drop or gain by the number of inches between readings to obtain the sine of the angle of error. Also, if you will use the fact that 4 micro inches equals 1 second of arc, no sine tables are necessary. The whole matter then reduces to simple arithmetic.

To establish the mathematical sign, this simple rule is all that need be remembered:

If  $h_2$  is greater than  $h_1$  the sign is

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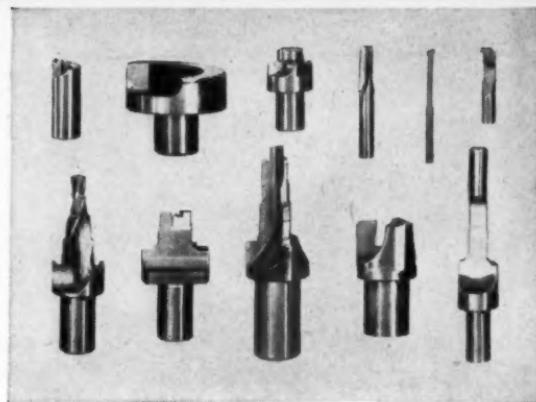
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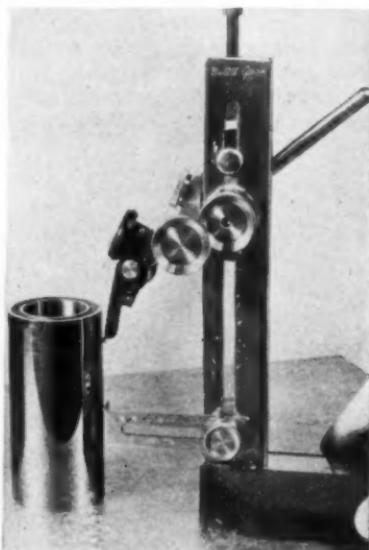
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negative, the column is leaning forward, and the error is subtracted from  $90^\circ$ . If  $h_2$  is less than  $h_1$ , the sign is positive, the column is leaning backward, and the error is added to  $90^\circ$ .

If no dial gage is available for the readings, the same results can be obtained by setting up a height gage with gage blocks and a long caliper bar or scribe. The same formula is applied and the same method is used in establishing reading  $h_1$ . The gage blocks will have to be shuffled to obtain reading  $h_2$ , however. Then the amount of difference between readings, divided by the distance between them is the sine of the angle of error. As before, if  $h_2$  is greater than  $h_1$  the mathematical

**Fig. 5**—This setup may be used to check height gage columns, cylindrical squares (shown in photo) or the solid square. A second dial may be used in place of the stop, if available.



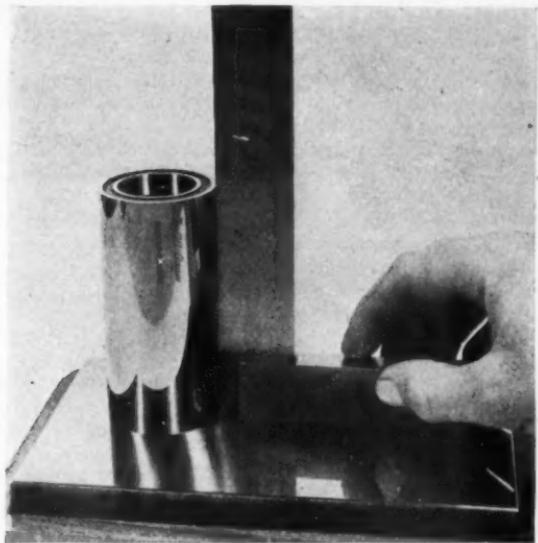


Fig. 6—The simplest method of testing angle or wear on blade of the solid square is to butt it against a master square and see if it will shut out light.

sign of the error is negative and the column is leaning forward.

#### A Second Method

There is a second, much simpler, method, if the inspector has the equipment. The setup is similar to the one shown in Fig. 5. Here a dial gage setup is made, with the anvil zero point at a fixed distance from the column of the master gage. The height gage then is placed against the anvil and the fixed stop and the reading noted. This reading, if greater or less than zero, divided by the distance between anvil and stop gives you the error per inch of length of the column. The rest is a simple problem in arithmetic as outlined previously.

If still greater accuracy is required, which it would not be in the case of

the height gage, but might be in the case of some of the more precise measuring devices, the same sort of setup can be made with two gaging heads connected to the dials of the electric comparator. With this setup the error can be found in micro-inches and, since 4 micro-inches is equal to one second of arc, the rest, again, is simple arithmetic.

The methods of inspecting the electric type of height gage shown in Fig. 3 will be detailed later in the chapter on comparator inspection.

#### Inspecting the Solid Square

The solid square—which is not solid at all but consists of two flat bars of metal fixed to each other at right angles—finds much use in layout work and for checking on work in milling

machines and shapers where the surface of the work piece is supposed to be "square" with the sides. In layout work it is commonly used much like a try-square in carpentry or a T-square in drafting, often as a guide for the scribe or marking stylus. For this reason, either side of the blade is subject to considerable wear.

The solid square often has a scale etched into the blade, sometimes one on each side. The scale may be inspected and calibrated, if required, by the same methods as those detailed previously for other scaled instruments. The wear on the blade must be determined as in the case of the perpendicularity of the height gage. There is seldom any reason for damage to knock the blade awry, because these instruments are usually small and quite rugged.

The simplest procedure is to set the square on its base (also known as the beam) and push the blade against a double or single dial gage setup as

shown in Fig. 5. The lower gage often is omitted from these setups, being replaced by a bar stop, as shown, projecting the same distance from the column as the anvil of the dial, when the dial is on zero. The drop or gain on the dial is then divided by the distance between dial and stop to discover the amount of error per inch in the square. Gage maker's tolerance again is 0.0005" per inch.

If such a dial gage setup is unavailable, the square may be clamped to the side of a master (cylindrical) square with the blade projecting horizontally, being careful to use felt or some other material under the clamps so the square will not be damaged, and measure the amount of drop or rise on the blade with a height gage. Readings are taken at two points on each edge of the blade, and just as with the height gage studied earlier, the difference divided by the distance between them, and the resulting sine of the angle or error looked

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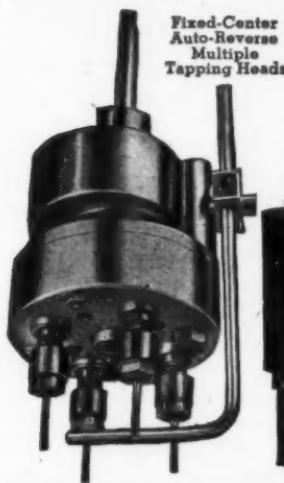
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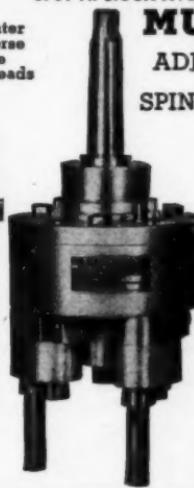


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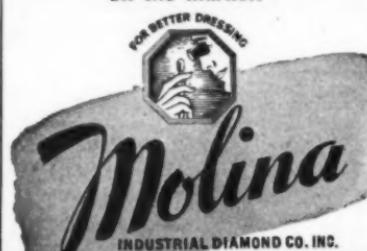
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(The next installment will consider inspection of the cylindrical square, the combination square, flats, and straight edges.)

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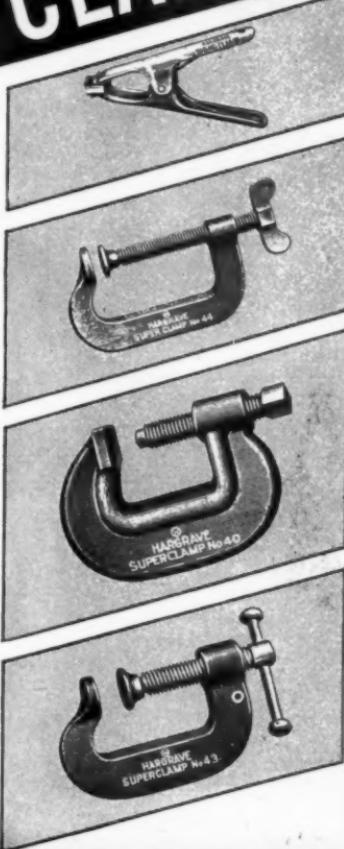
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# METAL STAMPING OPERATIONS

## Drawing Round Shells (Without Flange)

by

D. A. Rogers

Dayton Rogers Manufacturing Company

The expression "Drawing" as used in metal-stamping work describes an operation in which a flat sheet of metal is formed into a shell or cup shape with quite uniform thickness. It is generally a cold-working operation performed in a press and requires press-tools or dies made to produce the particular shape desired. A sectional view of a simplified die for drawing a round shell is shown in Figs. 1, 2 and 3. The drawing punch "A" has the shape of the inside of the desired shell or cup. The drawing die "C" has the same shape as the punch, except that it is just enough larger to allow one thickness of blank material between the die and punch periphery. A draw-plate or blank-holder "B" is usually necessary and is used to hold the flat blank material tightly against the die and prevent buckling of the

material along the outer edge during the drawing operation.

When the drawing operation is to be done in a single-action press, some method of applying force against the draw-plate must be provided. This force may be provided by springs, rubber bumpers, pneumatic cylinders (generally called Die Cushions) or hydraulic cylinders (cushions). Pneumatic or hydraulic cylinders will be found most practical for this purpose, as the force provided can easily be varied to suit the job by changing the pressure in the cylinder.

When used on a single-action press the drawing die "C" is attached to the press slide "G", the drawing punch "A" is attached to the press bolster "H", and the drawplate "B" is supported on pins "E" which rest on the cushion

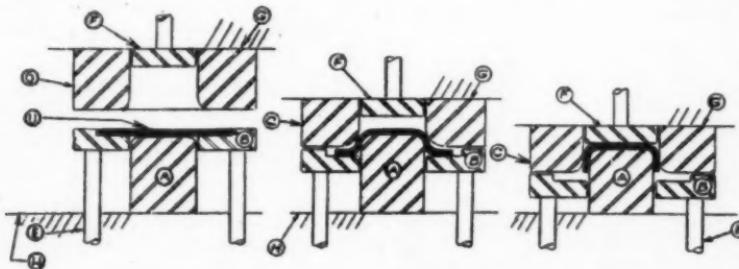


Fig. 1.

Fig. 2.

Fig. 3.

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(which is supported underneath the press bolster). A knockout "F" is usually provided for ejecting the finished shell or cup when completed. The top surface of the draw-plate is set level with the top of the draw punch. The resisting force to be supplied by the cushion is then adjusted to suit the job.

The drawing tools are now ready for use (Fig. 1). A blank "J" is laid on the draw-plate "B". The drawing die "C" is brought down by action of the press slide, contacts the blank "J" held on draw-plate "B" (Fig. 2), and continues down to the bottom of the press stroke (Fig. 3). As the center of the blank rests on the top of the draw punch, obviously that part of the blank resting on the draw-plate must do one of two things: either tear loose from the center of the blank near the circumference of the draw punch, or slide inward between the draw-plate and the die-face and take the shape of the space between the drawing die and drawing punch. If the proportion between blank diameter and draw diameter is correct and the proper resisting force is applied to the draw-plate, a smooth shell or cup of uniform material thickness will be produced. On the upward stroke of the slide, the shell is stripped from the punch by upward movement of the drawplate. At the top of press stroke, the shell is ejected from the die by the knockout "F." The draw-plate is returned to a position level with the top of the draw punch and the drawing tools are ready for another cycle.

Contrary to common belief, "Drawing" is not a stretching operation, but is instead a plastic flowing-inward of the metal held between the die-face and draw-plate and a flowing upward past the drawing die radius to produce the shell wall. With the exception of the material bending over the punch radius as the die starts down past the punch, all the plastic flow occurs in that

part of the blank in contact with the die face and passing over the die radius. Once the material has been drawn in past the die radius, there is no further plastic flow. To illustrate this, scribe radial lines (intersecting in the center) on a flat sheet of metal of suitable outline (the shell blank). If this blank is placed in the drawing die and partially drawn, the result will be as shown in cut-away view Fig. 4. Upon examination, it will be seen: First—that the radial lines on the center portion have not changed; Second—that the lines in the cylindrical part "N" of the shell have become vertical parallel lines; Third—that the lines in the flange or outer part of the shell remain radial, but have moved closer together. This shows that no plastic flow has occurred in the center portion—that no plastic flow is occurring in the cylindrical wall and that all the flow occurs in the flange portion and around the die radius. Further study will show that as the punch is pushing up against the center of the shell and the die is pushing down on the flange, the cylindrical wall must be in tension. This wall tension is transmitted around the punch corner into the center part of the blank where it has little or no effect, and around the die corner into the flange "J" of the shell, where it causes the material to flow inward "M". As the flange metal moves toward the punch, the circumference "L" is being reduced. This indicates that compressive forces "K" are acting in a circumferential direction in the flange "J".

When compressive forces are applied at the ends of a thin metal section, there is a great tendency to buckle or wrinkle. This condition in the flange tends to produce wrinkles in the shell as it is being drawn. To prevent the forming of wrinkles, a force is applied to the draw-plate "B" by a die cushion (or other means) thereby holding the outer part of the blank firmly against the die-



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Piqua, Ohio

face. The force applied against the draw-plate must be just sufficient to prevent the forming of wrinkles and still not great enough to prevent the inward sliding of the material on the die-face, which would cause fractures in the shell wall. As the force applied by a Die Cushion can easily be varied, it proves to be an ideal means of providing blank-holding pressure. An additional advantage of a Die Cushion is the ability to provide a uniform holding force thru the stroke of the cushion.

I. The factors which govern the possible height of single operation drawing of a shell are (in the order of importance):

1. Ratio of height to diameter of shell (i. e. height divided by diameter)

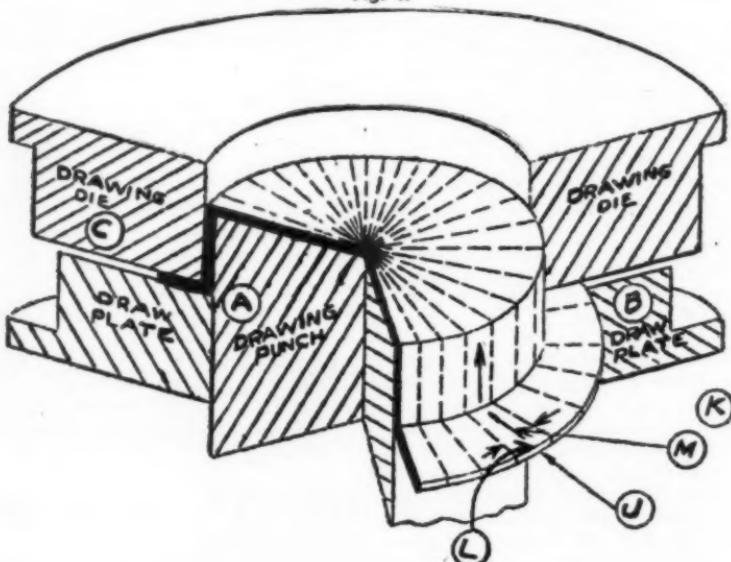
2. Ductility (workability) of the material.

### 3. Corner radius.

1. When drawing a round shell (without flange) in one operation, the maximum ratio of height divided by diameter may vary between  $\frac{1}{4}$  and a possible  $\frac{3}{4}$ , depending on the corner radius and ductility of the material. A generous corner radius helps to secure greater height in one operation, while too small a corner radius may cause the shell to fracture at the radius. Soft ductile material will permit drawing to a greater height in one operation.

2. Ductility of materials can be measured, (% elongation in 2" or % reduction of area). In general, materials such as deep drawing steel, annealed sheet steel (SAE 1005-1015), dead soft cold rolled strip steel (SAE 1010-1020), some stainless steels (Types No. 304, 410, 420 and 430), soft temper alumini-

Fig. 4.



nums (2SO, 3SO and 53SO for example), soft temper brass and copper will allow drawing to a maximum height in one operation. Other less ductile materials may require one or more pre-cupping (i. e. Additional drawing dies gradually reducing the blank to the diameter required) and possibly annealing between operations.

3. Corner radius of the shell has a considerable effect on the possible height of single-operation drawing. Corner radius should, when possible, be specified at a minimum of four times thickness of material when the height of the shell exceeds 1/3 of the diameter. When a smaller radius is specified, additional drawing or flattening operations may be required. In no case should the corner radius be less than thickness of material for one operation draw.

II. When the ratio of "height divided by diameter" exceeds  $\frac{1}{3}$ , it will be necessary in most all cases to reduce the flat blank to the finished shell by using two or more draw dies of proportionately decreasing diameters. In some cases one or more annealing operations will be necessary between first and finish draw operations. The necessity of annealing depends to a large extent on the workability of the metal being drawn.

III. Determination of the number of reductions necessary to draw a shell with ratios (height divided by diameter) greater than  $\frac{1}{3}$  cannot be done by hard and fast rules. In general, for ductile materials, with generous corner radius in the shell, the following procedure can be followed:

1. Height equals  $\frac{1}{3}$  to  $1\frac{1}{2}$  times the diameter of the shell—two reductions will be required.

2. Height equals  $1\frac{1}{2}$  to 2 times the diameter of the shell—three reductions will be required.

3. Height equals 2 to 3 times the diameter of the shell—four reductions will be required.

IV. It may be necessary to anneal

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3	$\frac{3}{8}$	1	5.33
3	$\frac{1}{2}$	1	5.62
3	$\frac{5}{8}$	1	5.92
4	$\frac{1}{4}$	1	6.66
4	$\frac{1}{8}$	1	7.47
4	$\frac{3}{8}$	1	7.47
4	$\frac{1}{2}$	1	8.36
4	$\frac{5}{8}$	1- $\frac{1}{4}$	8.36
4	$\frac{3}{4}$	1- $\frac{1}{4}$	9.10
4	$\frac{7}{8}$	1- $\frac{1}{4}$	9.83
5	$\frac{1}{4}$	1	10.57
5	$\frac{1}{8}$	1	11.16
5	$\frac{3}{8}$	1	11.16
5	$\frac{1}{2}$	1	11.16
5	$\frac{5}{8}$	1- $\frac{1}{4}$	11.16
5	$\frac{3}{4}$	1- $\frac{1}{4}$	12.34
5	$\frac{7}{8}$	1- $\frac{1}{4}$	13.46
5	1	$\frac{1}{4}$	15.75
5	$\frac{1}{4}$	$\frac{1}{4}$	15.75
6	$\frac{1}{4}$	1	14.56
6	$\frac{1}{8}$	1	14.56
6	$\frac{3}{8}$	1	14.56
6	$\frac{1}{2}$	1	14.56
6	$\frac{5}{8}$	1- $\frac{1}{4}$	14.56
6	$\frac{3}{4}$	1- $\frac{1}{2}$	16.13
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6	1	$\frac{1}{4}$	20.99
7	$\frac{3}{4}$	$\frac{1}{4}$	20.99
7	1	$\frac{1}{4}$	25.42
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## EDGE TRIMMING METHODS

### 1. Flange Trim and Finish Draw

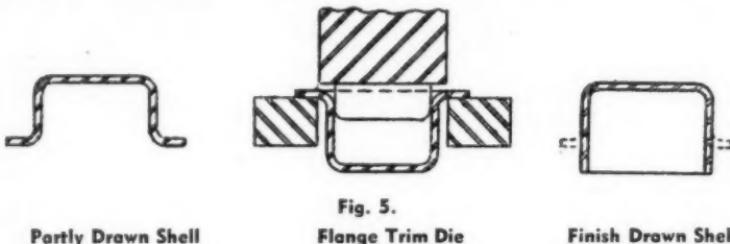


Fig. 5.

Partly Drawn Shell

Flange Trim Die

Finish Drawn Shell

This method is satisfactory for most shells particularly of diameters greater than two inches. Only one additional die is required, a trimming die.

### 2. Pinch Trim Die

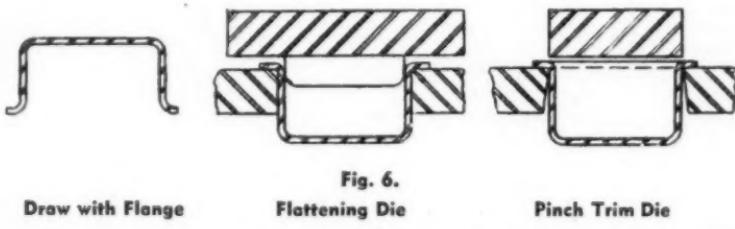


Fig. 6.

Draw with Flange

Flattening Die

Pinch Trim Die

This method will produce a shell with uniform height, but the edge is considerably rounded on the inside, which may be objectionable. The flange must be flattened to a sharp corner which will require 1 or 2 dies. 2 to 3 extra dies and operations must be figured on.

### 3. Machine or Box Trim

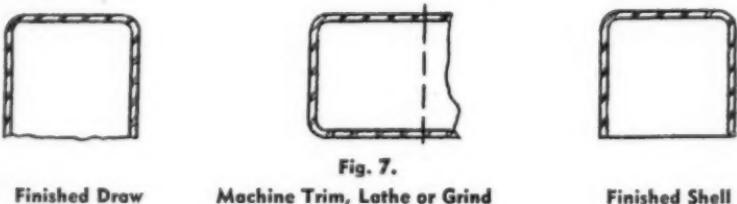


Fig. 7.

Finished Draw

Machine Trim, Lathe or Grind

Finished Shell

This method produces the best appearing edge but is slow running. Tooling cost is generally low. In some cases it is the only practical method of finishing.

the shell when more than two reductions are required. When corner radius is less than four thicknesses of material, add one or two flattening dies and operations, depending on corner radius desired.

For less ductile materials, it is more difficult to predict the number of operations required. In general, the measure of ductility of the material (per cent of elongation or per cent reduction of area) will determine the maximum reduction possible in one operation.

V. Finish of edge depends on the "height divided by diameter" ratio and on the material being drawn. For relatively shallow shells where the "height divided by diameter" ratio is not over 1/3, it is possible to produce an edge within commercial tolerances without requiring finishing operations. That is, the height and uniformity of the edge depends on the size of blank used. For higher shells it is not possible to do this, and one of the following finishing operations will be required:

1. Flange trim and finish draw—See Fig. 5.
2. Pinch trim—See Fig. 6.

3. Machine (lathe or grind) trim (box trim)—See Fig. 7.

4. Wedge or "Shimmy" die trim (not suitable for small quantities)

VI. A "Draw Reduction Table" is attached, offering a simple means of determining % of draw reduction and flat-blank diameter. By dividing the inside shell height by the mean shell diameter, a height-diameter ratio is obtained. Find this ratio in Column I of the table. Directly opposite in Column II find the % of reduction of diameter (a measure of the amount of cold-working to be done in drawing the flat blank into a shell). Directly opposite in Column III find the Blank-Draw ratio. Multiply this mean shell diameter by this factor to obtain the approximate flat blank diameter.

It must be understood that these tables can only be used with round straight-sided shells or cups. Shells or cups with flanges must be investigated by other methods. Care must be used when attempting to predict the number of operations required to produce a flanged shell or cup.

#### METAL STAMPING OPERATIONS — TABLE NO. I DRAW REDUCTION RATIOS FOR ROUND SHELLS (WITHOUT FLANGE)

To use table, divide height of shell by diameter of shell. Find corresponding value of Column I, % reduction of diameter is given in Column II (use to determine number of reductions required). Blank-draw ratio is given in Column III (blank-draw ratio x shell dia. = approx. blank diameter).

Shell height = inside height of shell.

Shell dia. = inside diameter of shell plus 1 thickness of material.

COL. I Height DIA.	COL. II % Reduction OF DIA.	COL. III Blank-Draw RATIO	.10	15.4	1.18
.01	2.0	1.02	.117	16.6	1.20
.02	3.8	1.03	.12	17.8	1.21
.03	5.5	1.05	.13	18.8	1.23
.04	7.1	1.07	.14	19.9	1.24
.05	8.7	1.09	.15	21.0	1.26
.06	10.2	1.11	.16	21.9	1.28
.07	11.5	1.13	.17	22.8	1.29
.08	13.0	1.15	.18	23.7	1.31
.09	14.3	1.16	.19	24.6	1.32
			.20	25.5	1.34
			.21	26.3	1.35

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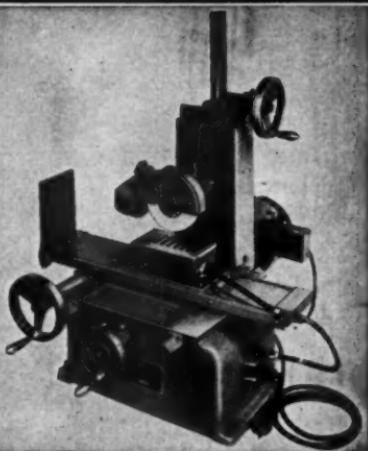
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COL. I Height DIA.	COL. II % Reduction OF DIA.	COL. III Blank-Draw RATIO
.22	27.1	1.37
.23	27.8	1.38
.24	28.6	1.40
.25	29.3	1.41
.26	30.0	1.43
.27	30.7	1.44
.28	31.3	1.45
.29	31.9	1.47
.30	32.6	1.48
.31	33.2	1.49
.32	33.8	1.51
.33	34.4	1.52
.34	35.0	1.53
.35	35.5	1.55
.36	36.0	1.56
.37	36.5	1.57
.38	37.0	1.58
.39	37.5	1.60
.40	38.0	1.61
.41	38.5	1.62
.42	39.0	1.63
.43	39.4	1.65
.44	39.8	1.66
.45	40.2	1.67
.46	40.7	1.68
.47	41.1	1.69
.48	41.5	1.70
.49	41.9	1.72
.50	42.3	1.73
.51	42.7	1.745
.52	43.1	1.758
.53	43.5	1.770
.54	43.8	1.780
.55	44.2	1.790
.56	44.5	1.800
.57	44.8	1.810
.58	45.1	1.820
.59	45.4	1.830
.60	45.8	1.840
.61	46.0	1.850
.62	46.4	1.862
.63	46.7	1.873
.64	47.0	1.885
.65	47.3	1.898
.66	47.6	1.910
.67	47.8	1.920
.68	48.1	1.930

COL. I Height DIA.	COL. II % Reduction OF DIA.	COL. III Blank-Draw RATIO
.69	48.4	1.940
.70	48.7	1.950
.71	49.0	1.960
.72	49.2	1.970
.73	49.5	1.980
.74	49.8	1.990
.75	50.0	2.000
.76	50.2	2.010
.77	50.5	2.020
.78	50.7	2.030
.79	51.0	2.040
.80	51.2	2.050
.81	51.4	2.060
.82	51.6	2.070
.83	51.8	2.080
.84	52.1	2.090
.85	52.4	2.100
.86	52.6	2.110
.87	52.8	2.120
.88	53.0	2.130
.89	53.2	2.140
.90	53.4	2.150
.91	53.6	2.160
.92	53.8	2.170
.93	54.0	2.178
.94	54.2	2.185
.95	54.4	2.194
.96	54.5	2.201
.97	54.7	2.208
.98	54.9	2.216
.99	55.1	2.224
1.00	55.3	2.231
1.05	56.2	2.28
1.10	57.0	2.32
1.15	57.8	2.37
1.20	58.5	2.41
1.25	59.2	2.45
1.30	59.9	2.49
1.35	60.5	2.53
1.40	61.0	2.56
1.45	61.6	2.60
1.50	62.2	2.64
1.55	62.7	2.68
1.60	63.2	2.72
1.65	63.7	2.76
1.70	64.2	2.79
1.75	64.6	2.83
1.80	65.1	2.86

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COL. I Height DIA.	COL. II % Reduction OF DIA.	COL. III Blank-Draw RATIO
1.85	65.5	2.90
1.90	65.9	2.93
1.95	66.3	2.97
2.00	66.7	3.00
2.05	67.0	3.03
2.10	67.4	3.06
2.15	67.8	3.10
2.20	68.1	3.13
2.25	68.4	3.16
2.30	68.7	3.20
2.35	69.0	3.23
2.40	69.3	3.26
2.45	69.6	3.29
2.50	69.9	3.32
2.55	70.2	3.35
2.60	70.4	3.38
2.65	70.7	3.41
2.70	70.9	3.44
2.75	71.2	3.47
2.80	71.5	3.50
2.85	71.7	3.53
2.90	71.9	3.56

## PRECISION PARTS AND ASSEMBLIES

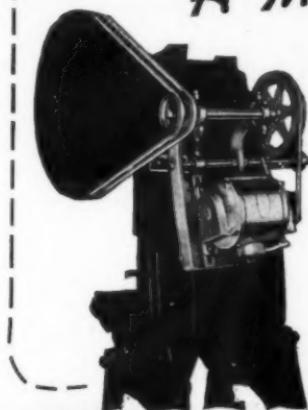
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**FULFLO** Specialties Co., Inc.  
BLANCHESTER, OHIO

# THE FOREMANSHIP FORUM

By Edmund Mottershead

## WHAT TOP MANAGEMENT CAN DO TO MAKE FOREMEN FEEL THEY ARE REALLY A PART OF MANAGEMENT

A good deal of talk has been bandied about on the subject of the foremen's union. As far as many members of top management are concerned, this development is just another manifestation of these unsettled times. (Why do they act that way? Haven't we treated them better than anyone else would have for the past twenty years? Etc.)

The fact of the matter is that this development among supervisors and foremen is just another logical outgrowth of certain management policies (or lack of policies) which is responsible for a good deal of so-called labor difficulty. With occasional fortunate exceptions, the average foreman in an industrial plant has seen, over the years, his power and authority dwindle, his executive functions in rate setting and methods development and production scheduling taken over by top management staff departments, until in many cases he has been reduced to the practical status of working lead man. At the same time, skilled workers with union support have in a great many instances been able to extract from top management greater weekly income than their "boss," the foreman.

It is really little wonder then, that the foremen are beginning to think that maybe "organization" can do them some good. However, as far as management is concerned, the foreman still has cer-

tain definite functions as a leader of his department, and in those functions top management would like the foreman to act as management representative. To achieve this, it is necessary that the foreman feel that he is really a part of top management. How can this be accomplished?

It is not within the scope of this article to try to cover all of the ways and means individual plants can use to get the foremen to feel a part of management, but there are at least six factors of primary importance, which apply to nearly all situations and plants:

1. Pay the foremen enough money to give them some incentive for taking responsibility.
2. Give them definite authority and allow them to go ahead and use it.
3. Back up your foremen in their decisions, especially in matters of discipline, worker-relations.
4. Establish equitable and scientific foreman-supervisor merit rating scales, geared to a promotion program.
5. Let them get "on the inside" of top management thinking.
6. Consult them as to their opinion and knowledge on all matters of top management decision which affect their department.

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**Pay Them Enough**

Make sure that whatever the wage  
 rates on production jobs in the various  
 departments, the foreman's weekly pay-  
 check will be at least a few dollars  
 more than that of the highest paid  
 worker in his department. It is even a  
 good policy to have the foreman's  
 weekly salary sufficiently high to be  
 above a worker's pay, including a cer-  
 tain amount of overtime wages.

If he has the responsibilities of getting  
 out production, of making innumerable  
 reports, of handling the people; if he is  
 getting paid for using his head instead  
 of his hands, he is entitled to direct and  
 adequate financial compensation for  
 that responsibility.

In addition, while for nearly all types  
 of employees their personal payrate is  
 a very important factor, the element of  
 job security is fully as important. Your  
 foremen should be able to feel that no  
 matter what happens, unless the com-  
 pany ends in bankruptcy or they are  
 guilty of gross negligence or incompe-  
 tence, their own jobs are more secure  
 than the jobs of the workers under  
 them.

**Authority**

A large number of companies today  
 still do not have a definite written state-  
 ment or outline of company rules and  
 regulations, including exact definitions  
 of the duties, responsibilities, and spec-  
 ific authority of foremen and super-  
 visors to act in certain cases.

In matters of discipline, reprimand,  
 recommended discharge of workers for  
 cause, transfers, job assignments, set up  
 clear definitions of the amount of  
 authority the foreman is to have at each  
 level of responsibility. State exactly  
 how he is to handle a worker's griev-  
 ance. Put it in writing.

And once such a statement is pre-  
 pared, not only give the foreman full  
 authority to act accordingly, but insist  
 that he use to the fullest the authority  
 given him. I can remember one such

program, set up in a small organization employing roughly 200 workers. The plant superintendent was pestered with upwards of 150 petty grievances each week, spending most of his time chasing soap for the women's lounge or settling some other unimportant matter. After defining in writing the responsibility and authority of the lower rank supervisors, teaching them to use it and insisting that they carry their load, his own load of grievance handling dropped to one or two major problems in the space of two months.

#### Backing by Top Management

When, acting according to top management policy and instructions, or following thru on a program endorsed by management, the foreman makes a decision to the best of his ability in his department, back him up. He may be wrong. But if he is really a part of top management, then top management has got to stand back of his decisions.

There is no middle ground. Either the foremen are part of management or not. If not, it is probably proper to let him remain a working lead man. If it is desired that he feel himself to be a part of top management, then he must become part of management in reality. And that means full support right down the line.

#### Merit Rating Scales and Promotions

One of the biggest difficulties in the way of any management program with regards to foremen, training program or other, is the fact that the average foreman cannot see how he himself will benefit by carrying out the program... in terms of more pay or promotion. There is a justifiable feeling in many cases that somebody will have to die before he can possibly get another raise or promotion.

In modern plants, where job evalua-



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### ALL STEEL MORE STROKE SHUT HEIGHT

#### Specifications . . .

Stroke (Standard) . . . . .	3"
Throw of Crank . . . . .	1 1/2"
Crank Diameter . . . . .	2 1/2"
Maximum Shut Height . . . . .	7"
Maximum Height Under Ram Up . . . . .	10"
Adjustment of Ram . . . . .	5"
Ram Opening for Punch Stem 2 1/2" deep . . . . .	1 9/16"
Bolster Plate Plug Diameter . . . . .	4 1/4"
Bolster Plate Area . . . . .	12" x 12"
Bolster Plate Thickness . . . . .	1 1/2"
Width Clear through Sideplates . . . . .	8"
Depth Center Ram to Back of Die Space . . . . .	6"
Height Bolster from Floor . . . . .	32"
Height from Floor to Center Crank . . . . .	54"
Height Overall . . . . .	66"
Area of Floor Space L to R and F to B . . . . .	20" x 24"
Flywheel Diameter . . . . .	25"
Weight of Flywheel . . . . .	300 lbs.
Weight (Less Motor) . . . . .	1000 lbs.
Bearings—Crank . . . . .	Bronze 1/4"
Speed Recommended . . . . .	Strokes per minute 120
Motor Recommended . . . . .	1 H.P., 1200 R.P.M.
Ram Bearing Plates . . . . .	Cast Iron
Inclinable (4 positions) . . . . .	Maximum 30°

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tion and pay scales are so set-up that workers can foresee increased earnings as they become more efficient, there is no reason why acceptable and equitable merit rating scales for foreman and supervisor performance cannot be developed to the point that they can be used as a guide to a definite program of promotions and earned raises in pay. Such a step will let the foremen feel that they have at least a 50-50 chance of getting a raise sometime in the foreseeable future if the record shows it is deserved.

### Let Him In on the "Inside" of Things

One of the strongest factors in making a man feel that he is a part of top management is for him to feel that he has inside information, that he really sits in on future plans and policy making. When new products, new policies, new programs, new methods are being developed by top management, get the foremen into the picture early.

If for no other reason, it is important to let them know what is coming sufficiently in advance so they can adjust their thinking accordingly. It also has the added value of eliminating the feeling on the part of some foremen that if they had any ideas, management wouldn't be interested anyway. And it saves a lot of explaining why a thing is done the way it is done. . . having sat in the beginning of the new developments, the foremen know most of

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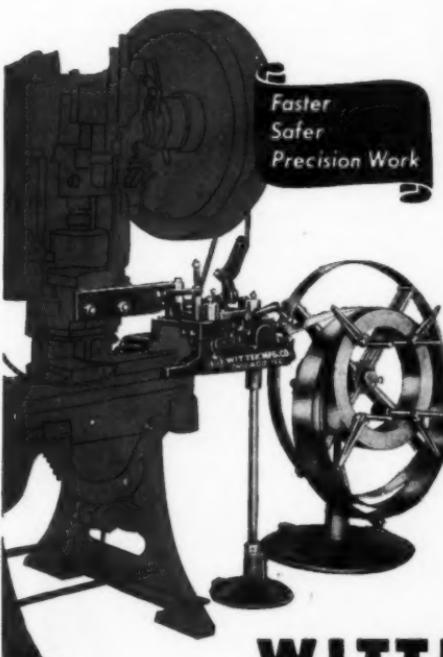
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# Planning Peacetime Production Using Coiled Strip Stock?

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Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

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### One Week Delivery

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MODEL "D"  
Slide Travel 1"  
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MODEL "H-D" 2  
3 sizes of slide travel 2-1/2",  
3-1/2", 4-1/2"  
Boring Capacity 26".

the why's and wherefore's.

### Consult Your Foremen

Along with a desire to feel that he is on the inside of new ideas and developments, the average foreman with any amount of experience will appreciate being consulted by top management as to the wisdom of a given policy or the value of a new method. The old feeling that a man is supposed to know something after twenty years' experience still persists, right or wrong, and it is definitely a slur on the foreman's ability and intelligence to go ahead without consulting him on matters which will affect his department.

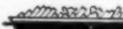
It is also some reflection on top management itself, not to consult the foremen, because if the foremen are not worth consulting, top management probably was fairly lax in allowing those particular men to become foremen in the first place.

Considerable thought has been given to the problem of securing the cooperation of foremen in carrying out management policy and interpreting that policy to the rank and file employe. This strategy of consulting the foremen before making policy effective will go a long way toward obtaining the desired cooperation.

There is one other element in the picture which bears examination. This is the problem of selling such a program as outlined above to the foremen who are suspicious after years of "being

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Wide x 6 1/4" Deep  
16 Ga., drag holes,  
handles both ends.



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pushed around," as they term it. You build confidence by starting with what the men will believe. . . what they already believe and will accept. They will believe in a raise in pay when they get the money, not before. They will believe that they have management backing when occasion arises to demonstrate the fact, not before. They will believe that they have authority when they see

it in writing and have a chance to go ahead and use it without a kick-back in the front office. They will believe that they are a part of management when they can act accordingly, not before. Take advantage of every opportunity to prove to your men that you really mean what you say when you tell them that they are a part of management.

**Check List For Top Management: How Do You Treat Your Foremen? YES NO**

1. Does every foreman in your plant receive more pay than any worker under his supervision?
2. When lay-off's occur, are your foremen the last to go?
3. Do you bring your foremen into the picture early when planning new programs, policies, etc?
4. Do you make a definite effort to consult each foreman when a matter of policy is being considered that might affect his department?
5. Do you have a definite merit-rating or performance-rating system applying to your foremen and supervisors?
6. Do you have a definite program of periodic pay increases for foremen and supervisors?
7. Can your foremen see a chance for further advancement in the organization without waiting until somebody dies?
8. Have you tried departmental group bonus plans with the foremen taking a substantial share in the bonus?
9. Do you give your foremen and supervisors full support in their decisions, even when they have made a mistake?
10. Do you have a written outline of responsibility and authority for each foreman so he knows just how far he can go and how far he is required to go?
11. Are your foremen really part of management and not just stooges?
12. If you have merit-rating and performance-rating, are these plans integrated with promotional and pay raise plans?
13. Have you convinced your foremen that when they have ideas you are willing to listen and really want to hear from them?
14. Do you feel that your foremen are worth consulting?
15. Do you invariably get the full cooperation from your foremen which you wish to have?

**REMEMBER: Foremen will feel that they are part of top management when they become part of top management.**

# PRODUCTION OF EXTREMELY ACCURATE EMBOSsing DIES

By

Carl O. Malmstrom

General Superintendent New Method Steel Stamps, Inc., Detroit, Mich.

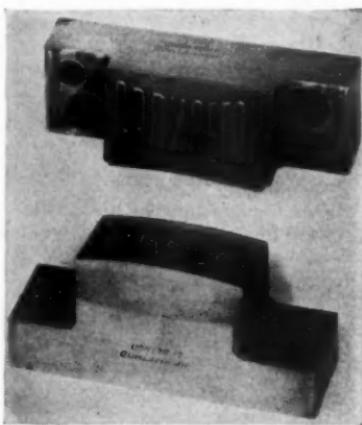
Under today's conditions, machine marking of trademarks, monograms, etc. with embossing and de-bossing dies on all kinds of commercial sheet metals and even such materials as fiberboard, is frequently more economical than the use of Decals or special name-plates involving manual labor. The larger the production run, of course, the greater the savings, since the initial equipment cost, even though relatively low, can be amortized over a larger number of pieces.

All the equipment necessary is a press and a set of comparatively inexpensive dies.

The main requirement for the press is that it should be sufficiently powerful to produce the desired impressions. As to the male and female embossing and de-bossing dies, these must be of a consistently high degree of accuracy. Fortunately, this does not involve a high cost. One method used to produce the dies combines metal spraying with high precision pantographic engraving. At New Method Steel Stamps this process has amply demonstrated its ability to rapidly and economically produce embossing and de-bossing dies of a high degree of mating accuracy. It is particularly effective when dies require relatively intricate designs.

First step in this die making process is the preparation of a large brass pattern for the male embossing or de-bossing die. These patterns are made much larger than the final die. In addition, they are made to a high degree of precision. Ratios between the brass pattern and the finished replica on the die range up to 16 to 1. Thus, any error in a 16 to 1 pattern will be only 1/16th as large in the completed die.

The brass pattern is used as a template in the pantographic milling of the male die. After the male pattern has been completed, it is sprayed with a soft, special-metal alloy to a depth of



Proper clearance for the gage of sheet metal to be stamped is allowed in the completed, mating dies. This avoids shearing or tearing of the sheet metal during the embossing or de-bossing operation.

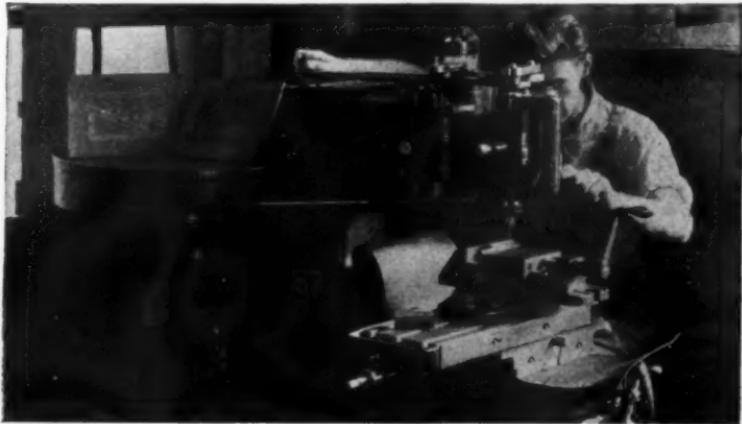


**Typical male and female embossing dies as produced at New Method Steel Stamps, Inc., by combined pantographic engraving and metal spraying.**

approximately  $\frac{1}{8}$ ". When set, the metal is removed from the pattern in one piece. This becomes the female pattern. It is actually a "precision casting" which is an exact reverse reproduction of the male pattern.

An important step in making up the female die by the pantographic process is to allow the proper amount of clearance for any gage of sheet metal between the completed, mating dies. For this, of course, the thickness of the sheet metal to be embossed must be known. The correct clearance is incorporated in the dies. This assures that there will be no shearing or tearing of the sheet metal during the embossing or debossing operation.

Use of pantographic milling and metal spraying in conjunction at New Method has been applied successfully to the production of a great variety of embossing and debossing dies. In all such cases it has proved both economical and highly accurate.

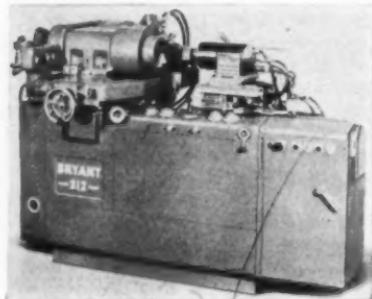


**One of several high precision pantograph machines used for preparing male and female embossing and debossing dies. Patterns or templates for the dies are made of brass, sometimes 16 times as large as the actual die pattern. This further increases the accuracy of both the dies.**

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## AUTOMATIC INTERNAL GRINDERS

The No. 212 Bryant Grinder is designed to fill the need for a Precision High Production Automatic Internal Grinder requiring minimum operator attention. It



is so designed that where required, one or more machines can be operated by the same operator.

The machine has a 9" swing inside the standard water guard and a 12" total wheelslide traverse. It is suited for grinding work with bores from 5/16" in diameter up to 3 1/2" in diameter and the grinding traverse permits grinding of 3" bore lengths. For the smaller ranges of bores, Bryant Hi-Frequency wheel spindles operating up to 100,000 rpm may be used.

Movements are hydraulically operated to afford flexibility of operation. Cycle control is accomplished electrically so that the cycle can be readily changed to suit varying working requirements.

Three methods of automatic sizing can be provided for this machine. The basic machine is equipped so that change over from one method to either of the others can be accomplished merely by the addition of the sizing equipment.

Sizing from the truing diamond is ac-

complished by predetermined advance of the wheel beyond the wheel truing position, which is performed between the rough and finish grinding positions of the cycle. Wheel wear is automatically compensated for.

Automatic plug sizing is accomplished by a plug gage which automatically checks the bore size after each pass of the grinding wheel.

A third method of sizing can be applied wherein a diamond tipped finger, contacting the bore as it is being ground, operated electrical contacts at the proper time to arrest the grinding action of the machine withdrawing the wheel from the bore, ready for the insertion of the next workpiece.

For further information write Dept. BB, Bryant Chucking Grinder Co., Springfield, Vt.

## ASSEMBLY & FORMING PRESS

The manufacturers of the "Automark" report it has proven to be something new in efficiency concerning the assembly and forming of medium sized and small parts. This machine was originally designed for high speed marking, but they say it has proven to work equally as well for assembling, forming, and other medium and light pressing operations.

The "Automark" can be operated either automatically or by hand. The parts to be assembled, marked, formed, blanked or stamped, have only to be touched into the locating fixture containing a Micro-Switch.

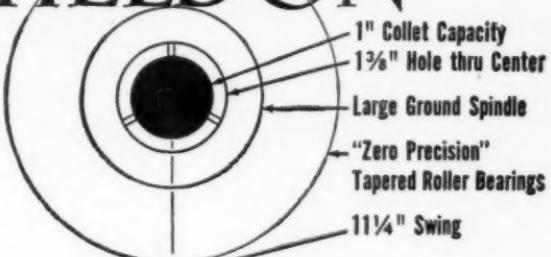
The machine is equipped with a hopper-type dial feed fixture, which can be supplied, marked 15,000 parts per hour. The average hand fed set-up is claimed to accommodate up to 3000 parts per hour.

Customers may consult their engineers and tool makers for the most efficient fixtures for any specific job. Write to Defiance Machine & Tool Co., Dept. BB, 1920 S. Vandeventer, St. Louis 10, Mo.

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TRB-S56  
Precision  
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No other moderate priced lathe and but a few of the most expensive, have the "Zero Precision" tapered roller spindle bearings, have beds and ways or lead screws held to such close tolerances. In standard quality tool features, no other lathe can offer as much capacity, utility, and convenience per dollar, as you get in the new Sheldon TRB-S56.

This 11¼" swing, 1" collet capacity, 56" bed precision lathe comes with full quick change gears, a full double walled apron with power longitudinal and cross feeds, 8 spindle speeds (35-1350 r.p.m.) and a fully enclosed double V-Belt underneath motor drive, mounted on a modern welded steel bench, complete, less motor for \$1000.00 f.o.b. Chicago.

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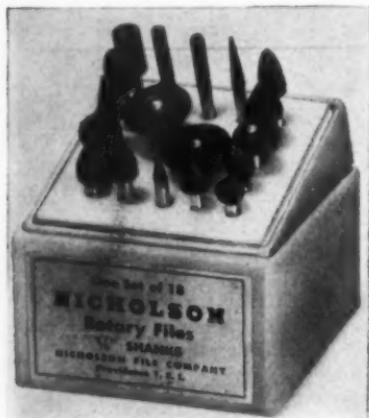
## SHELDON MACHINE CO. Inc.

Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers  
4298 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U. S. A.



## ROTARY FILES AND BURS

Nicholson File Co., 16 Acorn St., Providence, R. I., is now making a line of Rotary Files and Ground Burs with  $\frac{1}{8}$ " shanks. Used for relatively delicate op-



erations, these supplement Nicholson's line of Rotary Files and Burs with  $\frac{1}{4}$ " shanks which were introduced by the Company two years ago.

Nine standard styles or shapes are offered in either Hand Cut (Rotary Files) or Ground From Solid (Burs). Stock diameters of heads range in sizes from  $\frac{1}{8}$ " to  $\frac{3}{8}$ ". Shanks are code stamped for easy identification.

As a special feature, Nicholson offers assortments of 18 Hand Cut Rotary Files or 18 Ground Burs specially packaged in a cellophane-covered box which acts as a handy bench stand and protects the files when they are not in use.

Tool, die, pattern, jewelry, dental, and optical shops are among those who will normally find good use for Rotary Files and Burs with  $\frac{1}{8}$ " shanks.

## SEMI-AUTOMATIC LATHE

The Oster No. 650 Lathe is a single spindle machine equipped with four-speed motor, hydraulic feeds and semi-automatic features with all controls, including push button station, located conveniently for the operator. The machine is furnished with either single action or double action cross slides as desired. The hydraulically operated cross slide with

necessary valves and other control features provides an automatic cycle of fast approach—feed—dwell—fast retraction—stop. The headstock casting contains the spindle, spindle bearings, and oil reservoir. The four-speed motor furnished as regular equipment has an operating rating of  $7\frac{1}{2}$  hp maximum. The motor supplies direct drive for the ball bearing mounted spindle which is equipped with push-out or draw-back collet operated by a hydraulic cylinder. Starting and stopping motor is controlled through the push button station.

The hydraulic pump and its 2 hp motor and main relief valve are mounted in base of machine easily accessible thru the louver-door. Motor is controlled thru a magnetic switch actuated by a start-stop push button.

The automatic chuck is equipped with a draw-back collet with an adjustable work stop in the spindle. The collet is operated by means of a hydraulic cylinder with a 2" bore and  $2\frac{1}{4}$ " stroke. Collet is controlled by a lever-operated valve mounted on the bed, below the cross slide.

A centrifugal coolant pump is driven by a  $\frac{1}{4}$  hp motor. The push button station that controls the hydraulic pump motor also controls the coolant pump motor.

The machine, weighing about 3,000 lbs., is regularly furnished complete with motors, controls and related equipment but without tools. Dimensions are: Height 50". Width 44 $\frac{1}{2}$ ". Length 79" overall.

The new No. 650 Semi-Automatic Lathe is manufactured by The Oster Manufacturing Company, Dept. BB, Cleveland 3, Ohio.

## CONSOLIDATION

For many years, the Rolled Thread Die Co., and Reed Small Tool Works have been very closely affiliated. The companies have been located in one plant and operated under the same management.

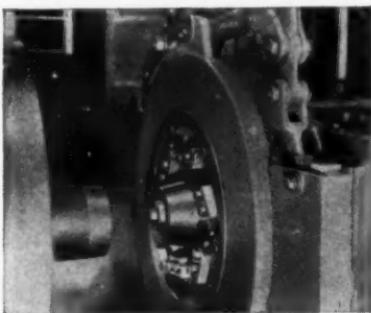
Both companies are now being consolidated and the name of the surviving corporation will be the Reed Rolled Thread Die Co., 237 Chandler St., Worcester 2, Mass.

The location of the plant remains the same and the ownership, policies, and personnel will not be affected in any manner by the change in names.

The Reed Rolled Thread Die Co. will specialize in thread and form rolling tools and equipment which include thread rolling dies and machines, knurls, and thread rolls.

#### CENTERING PILOT

The Centering Pilot developed by the Landis Machine Co., Dept BB, Waynesboro, Penn., is designed for their 8 $\frac{5}{8}$ " and



13 $\frac{1}{8}$ " Receding Chaser Pipe Threading and Cutting Off Machines.

The Spring Pilot is bolted onto the rear of the cross rail. Since this necessitates the removal of the cutting off slides, the machine is limited to threading only when equipped with the Spring Pilot.

Since the Spring Pilot forms a center in the bore of the die head for centering the pipe with the die head, only the rear chuck of the machine is used to grip the pipe during the threading operation. It is necessary that the front chuck clear the pipe by approximately  $\frac{1}{8}$ " to permit the pilot to fully engage the bore of the pipe.

The principal advantage claimed for the Spring Pilot is that it centers the pipe true with the die head assuring concentric threads and permits of higher threading speed. Chatter is eliminated from the thread by the pilot and the chasers can be set further back of center thus increasing the clearance back of the cutting edge.

#### RIVETING MACHINE APPLICATIONS

The H. P. Townsend Manufacturing Co., P. O. Box 1206 Hartford 1, Conn., has recently inaugurated a monthly bulletin, "The Townsend Riveter", giving case studies of riveting and allied problems which come to the Townsend engineering department. Bulletins will show the wide variety of applications to which riveting machines can be put.

To be placed on permanent mailing list, please send request on company letterhead with name and title to Dept. BB.

## THE New MODEL 1100 HYBCO TAP GRINDER



- Capacities No. 2 Mach. Screw to 1 $\frac{1}{2}$ " Hand Taps.
- All Settings Adjustable To Give Any Angle—Relief—Hook.
- Taps Held In Precision Collets Can Be Sharpened After Center Is Destroyed.
- Standard Motor—Any Current Specification.

*Representatives In Principal Cities*

**HENRY P. BOGGIS & CO.**  
1279 West 3rd Street  
Cleveland 13, Ohio

## MADE OF ALLOY STEEL MILLED FROM BAR

SOCKET HEAD  
CAP SCREWS



SAFETY HOLLOW  
SET SCREWS

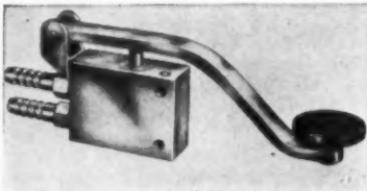
Try Them On Your Next Job!

ECONOMY  
MACHINE PRODUCTS  
COMPANY

5207 Lawrence Ave., Chicago, Ill.

### "FINGERTIP" VALVE READY

The new precision-built three-way Mead Fingertip Valve is compact, neat and sensitive. It is declared to have plenty of capacity to give fast action to cylinders



up to 4" bore or more. Note the parallel hose nipples leading from the back of the valve, and the mounting holes by which it can be quickly attached to either vertical or horizontal surfaces. The button operator's wrist can rest on the table if desired. (Travel of button from full closed to full open position is  $\frac{1}{8}$ " approximately).

As safety equipment, two Model FT-1 valves, connected in series provide an ideal means of preventing accidents in air press operations. If the fingertip controls are spaced far enough apart, both

hands are required to operate the press, making it impossible for one hand to be left under the descending ram.

Four styles are available.

For complete information, write Mead Specialties Co., 4114 No. Knox Ave., Chicago 41, Ill.

### PORTABLE ELECTRIC HOISTS

A new line of roller-chain electric hoists of  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and one-ton capacity, has just been announced by the Whiting Corp.,



Dept. BB, Harvey, Ill., manufacturers of cranes and industrial equipment. The one-ton hoist weighs only 87 pounds, light enough so that one man can install it or move it without assistance.

The hoist frame is a steel casting. Hence, the load is carried on steel from hook to hook, assuring maximum safety.

An unusual feature of the new Whiting hoist is that it can be operated in an inverted position. This is an advantage where the overhead suspension point is high. Instead of carrying the hoist to the point of suspension, the cable is run out to the desired length, the hoist is turned upside down, and suspended from the hook. The load is then attached directly to the hoist.

Bulletin H-100, describing the Whiting hoist, is available upon request.

## REVOLUTIONARY NUT AVAILABLE

An entirely new nut, claimed by its inventor to revolutionize the nut industry is available for licensing or sale. The nut does not thread on the end of a member, but is slipped on sideways and locked in place. No shouldering is needed before threading. The inventor claims several distinct advantages of this nut over conventional nuts: it will slide on a threaded piece of stock which joins a support at either end; a conventional nut would be out of the question here. Any units with boxed-in members, which cannot be removed without considerable loss of time, when worn, will benefit from an application of this new nut.

The nut is easily locked with a slight twist of the wrist. The inventor further claims this nut to save time and money when used. . . the need for screwing a nut on a long threaded shaft is eliminated, the new nut is simply placed in position on the shaft and tightened.

The nut is available for outright sale or licensing by the inventor, Frank L. Roxs, 803 Case St., Evanston, Ill.

## VERNIER HEIGHT GAUGE

The Aim Products Company of Springfield, Mass. recently announced their new

quick-action vernier height gauge. This new versatile gauge is said to measure accurately in either hundredths of inches from 0 to 6", in fractions of inches by sixty fourths or metrically to fifteen centimeters by tenths of millimeters.

The manufacturers point out that this new vernier height gauge has many new convenient features: It operates by turning a plastic knob which adds speed in adjusting it to various heights; the slide which has a hardened steel scriber, is easily moved thru a unique gear action; the base is of specially treated aluminum, and attractively finished in crackle lacquer; the scale is of durable, highly polished steel.

The Aim Products Company has also designed many useful attachments for their new height gauge. Attachments may be obtained for holding a standard indicator and depth gauge. Another important feature is a pencil-lead holder which is useful in the pattern makers skills, both wood and plastic.

All metal parts are finished in baked enamel and a rust-preventative treatment is applied. The instrument is attractively packaged in a sliding-cover wooden box. Aim Products Co., Dept. BB, 1564 Main St., Springfield, Mass.

# WILLEY'S DIAMOND DRESSERS

## NATURAL WHOLE DIAMONDS

### Set in WILLEY'S METAL



Willey's Diamond Dressers can be adapted to all makes of grinders, for rough, semi-finish and finished dressing for grinding hardened parts requiring a precision ground finish.

A trial will convince you there is no wheel dressing tool on the market, costing two or three times the price, that will equal its performance and cost per dressing.

**WRITE FOR CATALOG 41** — Illustrates complete line of Willey's Diamond Tools and Mechanical Dressers.

No.	Usable Contents of the Diamonds		QUANTITY PRICES				Wheel Diameter
	Diameter	Length	1-35	36-50	51-75	76-100	
W-3	5/16	5/16	\$11.00	\$10.00	\$ 9.00	\$ 8.00	6 to 12
W-4	11/32	7/16	13.00	12.00	11.00	10.00	12 to 20
W-5	3/8	13/32	15.00	14.00	13.00	12.00	20 to 24
W-6	7/16	7/16	17.00	16.00	15.00	14.00	24 to 42

## WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway

Detroit 1, Michigan

## NEW THROATLESS UNIVERSAL HANDISHEAR No. 1418

The word "universal" is used to describe the design of their throatless shear, reports the Mechanical Service & Manufacturing Co. They state that this illustrates



the adaptability and versatility of the many varieties of cutting operations of the new Handishear. Whether used for close, intricate cuts on the bench or detached from its base by the auxiliary handle (for cutting large, versatile shapes on the floor), the work is said to be performed with ease.

The salient features of the Handishear are designed to make it acceptable for all types of work, be it curves, angular or radii cutting. The patterns are always in full view of the operator for most exacting cutting requirements, and all within the bounds of a sheet of metal. The starting point of any pattern can be cut from the most economical point nearest work. This saves time, metal and effort. Circles may be cut from within the circumference.

Handishear is claimed to be produced of Chrome-nickel-molybdenum alloy for assured strength, and the highest grade H. C. H. C. Blades are removable. These blades are asserted to produce clean cut sheared edges free from burrs. It is equipped to cut 14 gauge mild or 18 gauge stainless steel with same blade in order to eliminate change of blades or machine. The feature of having both hands above the work is a safety factor.

This throatless cutter, it is maintained, can perform many intricate cutting operations. Another feature pointed out is that it can be permanent or portable. It can

be removed from its base for use on big sheets of steel.

A few desirable territories are available for dealers. Write to Mechanical Service and Manufacturing Co., Dept. BB, 7141 S. Racine Ave., Chicago 36, Ill., for further details.

## EYE PROTECTION

A new rubber-frame goggle equipped with a large, single acetate lens and specifically designed to protect workers against chemical and dust hazards is announced by American Optical Co., Dept. BB, Southbridge, Mass. The goggle can be worn in combination with the company's R-1000 respirator.

This new AO goggle provides exceptional wide-angle vision, good ventilation and long wearing comfort. It may be worn directly over the eyes or over most types of prescription glasses. Recommended for wear on jobs requiring handling of acids and caustics, it protects against chemical splashes, spray and impact of foreign particles, and exposures to fine dust concentrations.

The goggle is equipped with a large acetate single lens—slow burning and shatter-resistant—which is made to conform to high optical specifications for clear, undistorted, wide-angle vision. The goggle is so designed that the lens can be replaced easily.

## HEAT TREATING

Manual For Heat Treating Services is a loose-leaf book  $8\frac{1}{2} \times 11$ " with illustrations. It is designed to help manufacturers get the full advantages of commercial heat treating services by informing them of the range of heat treating services, thus enabling them to intelligently specify their needs.

It is compiled and published by the Metal Treating Institute, Dept. BB, 420 Lexington Ave., New York 17, N. Y., and priced at \$4.00.

This book contains several sections which deal with subjects such as steel selection, peacetime NE steels, machinability, grinding, relationship between heat treatment and design, basic principles of heat treating, a general description of the various heat treatments, non-ferrous heat treating and brazing, cold treating, etc.

LOOKING FOR

?



**GREATER INSPECTION ECONOMIES?**  
Lincoln Park Gages made of cemented-carbide for high volume inspection provide at least 50 times the service life of steel gages . . . those made of chrome plate for average volume inspection have a service life at least 5 times greater than when steel is used. Lincoln Park has always offered the experience and facilities to produce good wear-resistant gages.

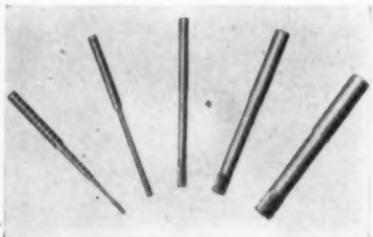


*Lincoln Park* **INDUSTRIES, INC.**

1731 FERRIS AVENUE • DETROIT 25, MICHIGAN

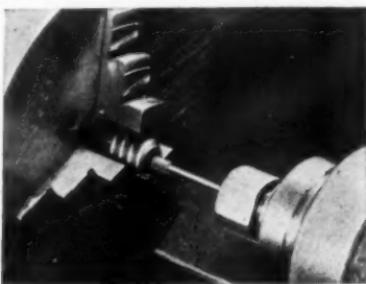
## MIDGET CARBIDE GRINDING WHEELS

Raymac claims to be the only company making solid carbide grinding wheels.



They have standardized their line from .030" to 0.250" sizes. In addition to the grinding wheels the company manufactures small carbide reamers, standard and midget carbide burrs and special carbide wheels and tools as required. Complete regrinding service is also furnished. All tools are precision ground by hand and not machine indexed.

Among the advantages asserted for the use of the carbide wheels are: 1—they can completely finish holes to close tolerances; 2—metal of any hardness can be removed, including Stellite; and 3—the high modulus of elasticity triples the



stiffness of the cutter shank permitting maximum cutting action with no distortion or tapering of holes.

The carbide reamers manufactured by Raymac are standardized in sizes from

Air Control  
Valves

1/2 inch 4-way Air Valves available  
in Lever Operated, Palm Operated,  
Foot Operated, Pin Operated, Pilot  
Operated, and Solenoid Operated  
Models.

IMMEDIATE DELIVERY

**PNEUMATICS INCORPORATED**  
of PLYMOUTH, INDIANA, U.S.A.

Manufacturers of  
Air Cylinders  
and  
Air Valves

The  
**MAXWELL**  
 Precision Boring Head

★  
 MAXIMUM  
 CAPACITY

★  
 MAXIMUM  
 ACCURACY

★  
 UNCONDITIONAL  
 GUARANTEE

★  
 .0002  
 ADJUSTMENT

★  
 MAXIMUM QUALITY

★ MINIMUM PRICE

• 3 sizes from \$44.00 to \$105.00.  
 Boring capacity  $\frac{3}{8}$ " to 15". Available with any standard shank.  
 Immediate delivery from stock. Circular upon request.

**THE MAXWELL CO.**

220 BROADWAY • BEDFORD, OHIO

**THREAD-ALL Tapper**



**PRECISION TAPPING  
 !! LICKED !!**

By Converting Any Drill Press into  
 a Precision Tapping Machine.

Check these advantages:

Handles small taps without fear of  
 breakage. Takes sizes up to 1  $\frac{1}{2}$ "  
 with ease.

Gives precision tapping without need  
 of lead screws.

Electro-magnetically controlled positive  
 depth setting.

No adjustments required for tap  
 sizes.

Silent forward and automatic high  
 speed reverse action.

Taps right or left hand without ad-  
 justment.

Machine may be used for drilling,  
 reaming, counterboring, etc. without  
 adjustment.

*Write for full details.*

**GRUEN GAUGE CO.**  
 10039 Marcus Ave. Detroit, Mich.



Pictured: a 38-Spindle Heavy-Duty Drill Head.

**DESIGNERS AND  
MANUFACTURERS OF  
MULTIPLE DRILLING EQUIPMENT**

*We invite your inquiry.*

**MICHIGAN DRILL HEAD CO.**  
971 E. 8 MILE ROAD HAZEL PARK, MICH.

.035" to 0.250". They are said to be particularly useful in reaming and restoring to required dimensions, without annealing, small holes distorted by heat-treating even to 62-65 Rockwell hardness.

Raymac's distribution as yet is by sales representatives in Detroit and Michigan, Illinois, Ohio, Wisconsin and Indiana. Production is being gradually increased and within a short time full national distribution is planned.

For further information write to Raymac Co., Dept. BB, 3729 Cass Ave., Detroit.

*High Speed Cutting Tools*

- Special high speed circular, dovetail, flat form and special tool bits.
- Design and manufacture of small machines, jigs, gages and experimental parts.
- Reshaping and salvaging high speed flat form, special bits and small flat broaches.

**DELIVERY AS REQUIRED**

**WRITE FOR QUOTES**

*Attractive Proposition for Representatives*

**Lincoln Park Manufacturing Co.**  
3302 Dix Road Lincoln Park, Mich.

**SELF-SEALING TEST PLUGS**

A self-sealing test plug is being manufactured for use in closing openings in tanks, boilers or other vessels which re-



quire hydrostatic or pneumatic internal pressure tests.

This product is known as "Hydro-Matic." It is manufactured by Mechanical Products Corp., Dept. MT, 168 N. Ogden Ave., Chicago 7, Ill.

These test plugs are in production and available for standard pipe openings from  $\frac{1}{2}$ " to 2" sizes. They are designed to fill the need for a speedy and effective means for sealing tank openings. The manufacturers report this is particularly true when the tank is under high pressure. They report that these plugs may be inserted or removed in a matter of seconds. They further state that they are self-sealing, leak-proof, safe and sturdy.

**OXYARC PROCESS FOR CUTTING STAINLESS AND ALLOY STEELS**

Arcos Corporation has developed a new method for hand cutting or piercing stainless and stainless clad, alloy steel, aluminum, bronzes, and brasses, cast iron, Monel, Inconel and nickel. The process known as the Arcos Oxyarc Process

achieves the cutting by the combination of an electric arc and a stream of oxygen.

The equipment consists of a specially designed Arcos Oxyarc holder, and a tubular coated Oxycuttend rod which is consumed in the process of cutting. The process can be used wherever an a-c or d-c welder and bottled oxygen are available. The "knack" of cutting with Oxycuttend can be acquired in less than an hour's time.

Because the Oxyarc Process will cut or pierce any metal, in any shape, and in any position, it can be used in a wide variety of metal cutting operations. The equipment used in the Oxyarc Process represents a versatile and effective hand tool for cutting metals—particularly stainless and non-ferrous metals.

For descriptive literature, write Arcos Corporation, 1515 Locust St., 436 Gulf Building, Philadelphia 2, Pa.

#### EXPANSION OF AIR ELIMINATOR VALVES

Expansion of the line of Risselt Air Eliminator Valves manufactured by the Risselt Division of the Lodge & Shipley Company's Special Products Division has been announced.

Added to the Risselt line is a companion valve for industry use and readily applicable to all steam processing. This industrial valve can be applied for high pressure heating up to and including 125 pounds pressure.

Deliveries of the industrial valve will begin early in 1947.

A dealer meeting and sales-merchandising conference for distributors of Risselt valves is being planned for February 6 and 7 at the Lodge & Shipley Special Products Division plant in Cincinnati, it was announced.

#### TECHNIQUE IN PAY DEMANDS

The technique of handling increased pay demands during the union's newest campaign is analyzed in a 17-page report published by the Research Institute of America, 292 Madison Ave., N. Y.

The report, "Entering the Second Round" covers labor's tactical position and approach; factors that management must take into consideration in meeting pay increase demands; management strategy and counter-offers, and the relative merits of taking the initiative and waiting for the union to do so.



**SYNTRON**  
REG. TRADE MARK

DEPENDABLE

## ELECTRIC HAMMERS

Make Short Work of  
Drilling — Cutting — Chipping  
in concrete and masonry  
Anchor bolt holes to set up machines — mount  
shaft hangers — channel for conduit — and a  
hundred other jobs around the plant.

Write for Folder No. 546

**SYNTRON CO.**  
300 Lexington

Homer City, Pa.



3600 BLOWS PER MINUTE

FOR ASSEMBLY, BENDING  
★ AND BROACHING ★

1883 - GREENERD - 1946

THE ORIGINATORS  
OF THE  
ARBOR PRESS  
IN 1883



Precision

Work in Manufacturing

An Arbor Press for every need, ranging from  $\frac{1}{4}$  to 30 tons capacity, both hydraulic and mechanical types. Write for Catalog G.

**GREENERD ARBOR PRESSES**

NASHUA, NEW HAMPSHIRE, U.S.A.  
EST. 1883

do  
**YOUR DRILLING**  
with the

*Speed-Right*

THE **Right**  
DRILL SPEED



The right drill speed is instantly available with Electro-Mechano finger-tip speed control. The right speed is maintained without further adjustment regardless of the number of pieces or type material drilled.

#### 8" BENCH DRILL PRESS

For holes .004" to 5/32"; .0001" chuck run-out; 1000 to 10,000 or 2500 to 15,000 RPM Speed Range

Electro-Mechano drill heads are complete units that operate in any position. They are available for multi-drill production set-ups.

For FAST—SENSITIVE—ACCURATE—and dependable small hole drilling, use the Electro-Mechano High Speed Precision Drill Press and the *Right* drilling speed.

BULLETIN 200

**The ELECTRO-MECHANO CO.**



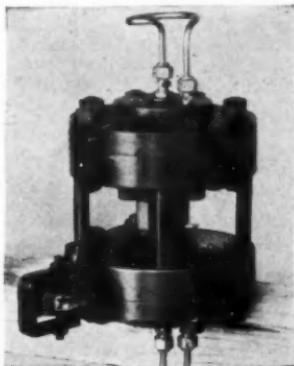
281 E. Erie St.

Milwaukee 2, Wis.

# Shop Hints

## ENGINE TESTING DEVELOPED FOR GENERAL MOTORS

Buick Division of General Motors, building a new setup for engine testing, is measuring force and horsepower with



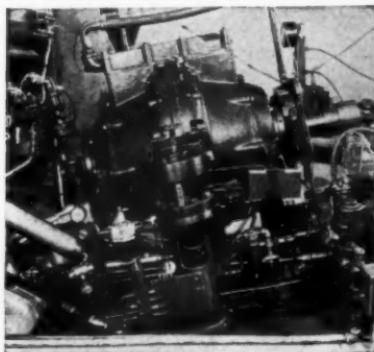
new methods, using the Pittsburgh-developed Hagan Thrustorg as the measuring instrument. Similar devices are to be employed on many different testing jobs. All of the Thrustorgs so far installed at Buick are used with dynamometers, the original application for which the device was designed. They are of the 12" and 30" size.

Buick is using the Thrustorg for both endurance and power runs. Standard practice involves running the engine for 100 hours and then taking it off the stand. It is then completely disassembled and checked for wear. After the checkup it is again placed back on the stand and run to failure at continuous speeds well above those expected to be developed

even in abnormally high speed operation of the finished automobile.

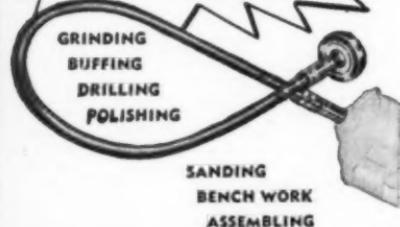
While considerable accuracy has been achieved in the past with weigh scales, the research men looked around to see whether any better method of force measurement was at hand. They investigated the Hagan Thrustorg, which measures force as the product of an accurately-measured air pressure acting on a precision diaphragm.

For Buick's engineers the Thrustorg held several advantages — it had no knife edges to wear, causing inaccuracy; it could be mounted in any position and at any angle, and readings from the tests



could be made at any desirable remote point. Further, it could be hooked up with any reasonable number of force or torque indicators. When the first Thrustorg had been operating satisfactorily for a year, the devices were introduced to other test stands.

with a **STOW**  
**FLEXIBLE**  
**TOOLSHAFT**  
 you can operate in  
 any position



*The* **STOW FLEXIBLE TOOL-SHAFT** can be attached to your bench-mounted motor, or to portable power unit, either electric or gasoline. Is easy to connect and disconnect to various tools. And its ample length and easy flexing make it ideal for reaching inconvenient places.

Every shop should have at least one STOW Flexible Tool-Shaft. For, in combination with the proper attachments, mechanics and maintenance men will find it indispensable in hundreds of important operations. Write for full details, or see your mill supplies or hardware dealer.

<b>5-FOOT MODEL</b>	<b>\$15.00</b>
<b>6-FOOT MODEL</b>	<b>\$16.50</b>

**STOW**  
 MANUFACTURING CO.

30 Shear St., Binghamton, N. Y.

Two other major tests are now being planned, each to be equipped with Hagan Thrustorqs, according to Buick engineers. One will be in connection with a Gleason axle-testing machine. The second will be a new chassis dynamometer testing machine.

The illustrations show a closeup of Double Thrustorq and an inclined engine dynamometer equipped with it in the Buick installation.

For more details on this device write to Dept. BB, The Hagan Corp., 323 Fourth Ave., Pittsburgh 30, Pa.

#### SELF-LOCKING DEVICE FOR HOOKS

A self-locking device that may be adapted to hooks used in hundreds of industries has been announced by W. H. Foster, Dept. BB, 4622 Kingswell Ave., Los Angeles.

This self-locking hook has a fulcrum latch member that closes the opening into the hook, and it is retained in this closed position. For swinging the latching finger into open position, a manually operated spring-held member is manipulated. A portion of this manually-operable member engages a part of the latching finger at a point a substantial distance away from its fulcrum, so as to effectively maintain the latching finger in position to close and lock the hook.

Uses: making positive yet readily releasable connections between cables used in hoisting equipment, and, in connection with the safety belts utilized by workmen engaged in the erection of pole or tower supported electrical equipment and the like. Also for hoists, cranes, towing couplings and shipping.

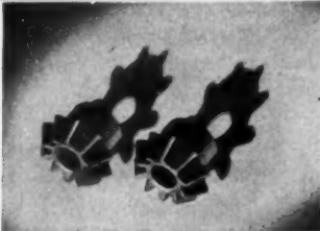
If you are a manufacturer equipped to make and market a product of this nature, check with the patent holder, W. H. Foster.

#### TRAILER TRUCK IMPROVED

Improvements in the design and construction of the "Phil-Dump" Trailer truck, are announced by Phillips Mine and Mill Supply Company, Pittsburgh, Pa. The trailer is now completely equipped with pneumatic tires, and a center caster which is optional, for greater maneuverability, ease in handling, faster haulage and dumping of scrap, castings, sand, etc. in steel mills, foundries and all types of industrial plants.

Complete data may be obtained by writing direct to Phillips Mine & Mill Supply Co., Dept. BB, 2227 Jane St., Pittsburgh, Pa.

*Need* FINE PITCH  
BEVEL GEARS?



Experience and skill are heavy factors in correctly producing fine pitch straight bevel gears. Teeth with proper bearing—minimum runout—accuracy of form and bevel—all of these involve special experience which Beaver Gear Engineers have gained in developing straight bevels up to 64 D.P., and finer in some cases. Highly specialized production methods and inspection equipment insure gears made to exact specifications.

For assistance with your problems on straight bevel gears, write or phone us for recommendations. No obligation of course.



Beaver Gear Works Inc.

**1033 PARMELE ST.**

## ROCKFORD, ILLINOIS

*Write for copy of  
our new bulletin  
describing Beaver  
Gear facilities  
and methods.*

# **DESIGNED . . . TO CUT COSTS ON GRINDING**



The Marschke Swing Frame Grinder provides smooth, true wheel rotation to assure steady contact between wheel and work-piece, bearing protection to maintain that condition, and maintenance of correct rate of wheel surface speed during all stages of wheel wear.

They take the wheel to the work-piece — are massive to resist vibration, yet even the largest sizes have maximum maneuverability.

The wheel is easily tilted a full 90° right or left of the normal vertical position. In any position, Marschke Swing Frame Grinders are well balanced, both longitudinally and laterally.

These grinders are made in sizes for 16", 20" and 24" wheels each powered for heavy duty service. For further information, write to:

**VONNEGUT MOULDER CORPORATION**  
1805 Madison Avenue      Indianapolis, Indiana

## DISTRIBUTION OF POWER

The distribution of power was one of the major projects in the planning of new and enlarged quarters for J. & J. Machine Products, Inc. of Dearborn, Mich.



Owner Jacob Young believed in the necessity of abandoning overhead belt drives when production was resumed after occupancy of 13165 Prospect in Dearborn.



After installing individual motors on various machines, they began to think about how to best bring power to not only the converted equipment, but also to other power-driven tools.

A raceway system appeared to solve most every problem. Therefore National Electric Surfaceduct was mounted directly to the building walls for machine tools, and also run down the top of work

benches where drill presses, grinders and such smaller equipment was located.

Among the converted equipment was a battery of 8 No. 00 Brown & Sharpe automatic screw machines. Power was supplied to each motor by a few feet of cable which dropped down to plug-in at conveniently spaced receptacles in the steel raceway. This wiring installation made possible the employment of short cables that are permanently high overhead and out of the way of men and materials.

Another efficient installation in the J. & J. building is the mounting of Surface-duct on the machine assembly work tables. A run of Surfaceduct raceway down the center of the tables makes it convenient for operators to plug in the smaller power tools as needed.

Circuits are controlled thru a heavy duty control box. The duct was joined to the control box by fittings which assured no obstruction in the raceway to interfere with maximum wire length.

Lathes, rotary and flat bed grinders also receive their power thru Surfaceduct in this new J. & J. shop in Dearborn.

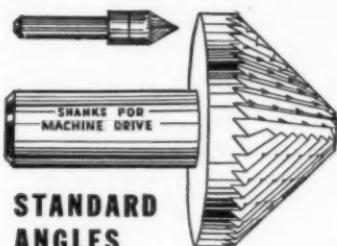
The National Electric Products Corp., will send further information. Write their Dept. BB, at Chamber of Commerce Bldg., Pittsburgh 19, Pa.

## WATER POWER GRINDER

Water, right out of any faucet provides all the power necessary to operate a new Turbo Grinder being manufactured by Hudson Products Co. of Detroit, Mich. The turbo operating power unit is small enough to fit into the palm of your hand. Equipped with a 3" diameter silicon carbide grinding wheel, it attaches to water pipe, or other convenient location. A vinylite hose with special slip-on connection fits most water faucets and connects the turbo unit to the source of water supply.

According to the manufacturer the turbo grinder can be set up ready to operate in one or two minutes. Then, simply by turning on the faucet the grinding wheel revs up from 3,000 to 10,000 rpm depending upon water pressure. Jet impeller and case of this unit is made of die cast aluminum. Case is chrome plated. Shaft of hardened stainless steel operates on Chrysler oilite bearing which requires no oiling. The unit is a very useful electrical grinder. Write to Dept. BB for further information.

## INSIDE DEBURRING CUTTERS



### STANDARD ANGLES

30° - 45°  
STOCKED IN 8 SIZES  
EACH ANGLE



### SPECIAL ANGLES FROM STOCK BLANKS



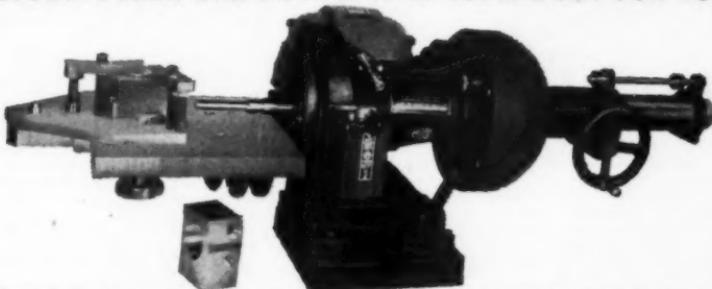
HIGH SPEED STEEL  
HANDLES  
FOR  
HAND USE  
(4 THREAD SIZES)  
RADIUS TYPE  
10 SIZES

WRITE FOR BULLETIN NUMBER 15-1

**SEVERANCE TOOL INDUSTRIES INC.**

722 IOWA STREET  
SAGINAW, • MICHIGAN

**HYDRO-BORER CAN DO A BETTER BORING JOB FOR YOU**



Model C-4F with special fixture for Industrial use. In operation shown, Hydro-Borer is boring and counter boring two holes at 14° angle in 14 ST Aluminum. Size of bore .625  $-.0005$  length 3-1/4". Special or universal work-holding devices are readily designed and built for mounting on the Hydro-Borer. Many operations possible on these versatile, accurate machines. Eccentric boring head, calibrated, permits advance in bore up to .014 without resetting tool. Bores from  $1/2$ " to 5" diameter by  $5\frac{3}{8}$ " spindle travel. Other models for Automotive and Aircraft application.

Write us for engineering information on your boring problems.

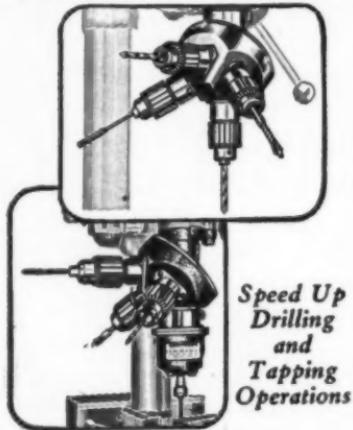
**HYDRO-BORER COMPANY**  
A DIVISION OF SOUTHWESTERN DEVELOPMENT CO.

214 W. Orange Grove Ave.      Burbank, California (Los Angeles County)

11 HOLES DRILLED  
3 DIFFERENT SIZES  
and 2 HOLES  
TAPPED  
IN  
25 SECONDS  
ON ONE PRESS

SLASH COSTS  
WITH

**QUADRILL and  
QUAD-TAPPER**



★ You, too, can offset higher wages by getting production costs down! Let QUADRILL (4 position drill head) and QUAD-TAPPER cut your manufacturing costs. Quick as a flash, operator indexes from one size drill or tap to another. No loss of productive time. No need to move part from one station to another. Write today for literature and prices.

**CHICAGO**

**DRILLIT CORPORATION**

1735 N. Winchester Ave., Chicago 22, Ill.

#### PHOTOELECTRIC SMOKE INDICATOR

Photoswitch Photoelectric Smoke Indicator, Type A20C, indicates the density of smoke passing thru the flue or broaching of a heating or power plant, and signals when this density approaches the values prescribed by municipal smoke ordinances.

Type A20C basically consists of a photoelectric control and light source. These are mounted on opposite sides of the flue, and the light source beam is projected across the flue onto the photoelectric control. A sensitivity adjustment permits the equipment to be set so that it will signal when smoke density approaches whatever value is prescribed as maximum by the local municipal smoke ordinance.

Supplementary equipment available includes bell alarms to signal excessive smoke, densometers to give continuous indications of smoke density and recorders to record the time of day at which excessive smoke passes through the stack.

Send to Dept. BB for Bulletin J-1046-B, Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.

It has a supply of 115 V ac with output connections of a single-pole, double-throw switch for normally closed and normally open operation. The contacts are 10 Amps, 115 V a-c 50-60 cycles non-inductive, and 125 V Amps 300 V or less 50-60 cycles inductive. Its weight is 6½ lbs.

#### GAGE MEASURES THICKNESS OF PIPES FROM OUTSIDE

A new thickness gage designed to measure the thickness of iron or steel pipes from the outside has been announced by the Special Products Division of the General Electric Co., Schenectady, N. Y. Called a pipe thickness gage, Type MS-A, the new instrument can be used on pipes up to  $\frac{1}{4}$ " in thickness and from 1 to 2" in diameter. Applications include checking the safety factor of pipes and tubing carrying petroleum products, chemicals, steam, or gas.

The gage measures the average thickness of a pipe over an area of several square inches. Accuracy of plus or minus  $1/64$ " can be obtained on clean surfaces, and  $1/32$ " on dirty surfaces. Dirt, scale, and paint on the inside of a pipe do not add to the thickness reading. The gage head and saddle combination weighs about  $6\frac{1}{2}$  lb. The instrument operates on 115-volt, 60-cycle power.

# MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S.

NAVAL AIRCRAFT FACTORIES

**BUTTERFLY FILING and  
SAWING MACHINE**

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D—10" Table; Model E.L.—12" Table. Model No. 14—14" table and heavy pedestals for all our machines.

**HARVEY MFG. CORP.**  
161 GRAND ST., NEW YORK

Phone CANal 6-5170



**BEWARE OF  
IMITATIONS**

Our machine  
carries the **Butterfly**  
trade mark.

Registered U. S. Patent Office

## For HIGH-RATIO Levers

*Specify*

**ROCKFORD**  
PULLMORE



- COMPACT DESIGN
- HIGH TORQUE
- HIGH-RATIO LEVERS
- POSITIVE NEUTRAL
- PRECISION BUILT
- LONG WEAR LIFE
- EASY ADJUSTMENT

MULTIPLE-DISC  
**CLUTCHES**

High-ratio operating levers give PULLMORE clutches powerful engagement with slight axial pressure and short movement of the shifter spool; consequently operation is quick and easy. Declutching is equally fast and positive. The shifter spool has an extra deep slot which is hardened and ground. This prolongs the life of the clutch, reduces wear on the shifter fork and holds run-out to a minimum.

**Send for This  
Handy Bulletin**

Shows typical installations of **ROCKFORD CLUTCHES** and **POWER TAKE-OFFS**. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



**ROCKFORD CLUTCH DIVISION**

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BORG.  
WARNER

# INTERCHANGEABILITY

Your KEY to

## MASS PRODUCTION

Will Speed up Drilling  
and Lower Costs

### A. S. A. STANDARD PRECISION DRILL JIG BUSHINGS

Standard sizes and styles in stock for prompt delivery.  
Write for catalog showing table of standard sizes of bushings with  
price list and other valuable information for the tool designer.



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ACCURATE BUSHING COMPANY, 440 North Ave., GARWOOD, N. J.

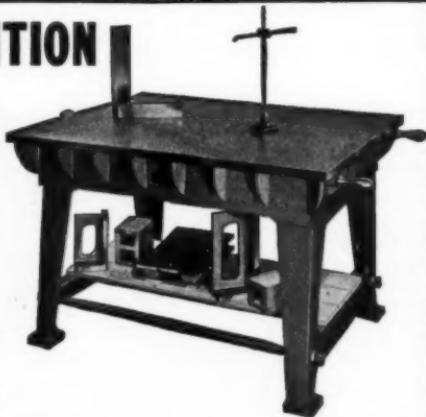
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## A USEFUL ADDITION

Modern precision machine shops and inspection departments will find this sturdy 36" x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. Write today for full information.



**J. C. BUSCH COMPANY**

165 SO. BARCLAY ST.

ENGINEERS AND MACHINISTS

SINCE 1907

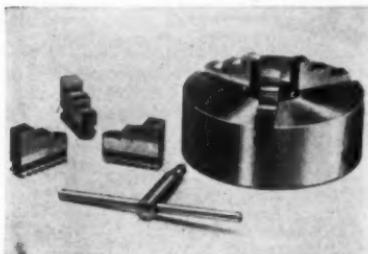
MILWAUKEE 4, WIS.

# Let's Talk Shop

## UNIVERSAL LATHE CHUCK

Falls Products Inc., Dept. BB, 122 N. Genoa St., Genoa, Ill., has produced a 5" Universal Lathe Chuck which includes many new features.

Three hardened alloy pinions have been



provided to reduce wear and eliminate search time. This chuck is threaded to mount directly on all lathes with 1½"-8 spindle thread, but also can be adapter-mounted to others. Two sets of interchangeable jaws, for internal and external grip made of hardened alloy steel, are furnished. Semi-steel is used for the body of the chuck and the scroll is of alloy steel.

A 6" Independent 4-Jaw chuck for 1½"-8 spindle thread mounting also is available.

## FORK TRUCK HAS 18-FOOT REACH

A new fork-type power industrial truck with an elevating reach of 18 feet above floor level is announced by Elwell-Parker Electric Co., Dept. BB, 4205 St. Clair Ave., Cleveland, Ohio.

New features of design and construction make the truck especially useful for high-tiering materials and merchandise.

It is compact, with increased speed and flexibility for maneuvering, and lifting and lowering loads.

It was developed for a nationally-known manufacturer of glass products. This company has had extensive experience with power trucks and now plans to utilize still more of the overhead space available in its warehouses and shipping rooms. In view of the building situation many other manufacturers may find a practical solution to their problems through similar means.

The new truck picks up loads on its bare fork or on pallets in the same manner as with standard models. Its capacity is rated at 4000 pounds for lifting to a height of 11 feet, and 3000 pounds to 18 feet. It is electrically driven, with three separate motors; one for traveling, one for operating the elevating mechanism, and the third for tilting the upright columns. Tilting limit is 15 degrees backward and 5 degrees forward from vertical.

Lifting speed with capacity load is 13 feet per minute, lowering speed 20 feet per minute; truck's traveling speed 5 miles per hour.

Body of the truck independent of the uprights and fork, is only 7 feet 8 inches long. Overall width is 3 feet, 2 inches, enabling it to maneuver in narrow aisles.

It is end-controlled, and the top of the body at the control panel is only 4 feet 2 inches above the floor level. Operator stands on a small platform 1 foot above the floor. The low, short truck body permits him to see, pick up and manipulate the load.

Controls are arranged on the panel at a height most convenient to the average-size operator. Power switch is actuated by foot pedal. End-control affords the operator maximum safety, as there is no obstruction to his own movement, and the moment he steps from the platform all power is shut off. End-control also

has an advantage over center control in that the operator can watch the load from a greater angle and is in better position to protect himself in case any part of the load should shift when in highest position.

It is identified as Model F24T.

#### ALL-ALLOY PORTABLE HAND SHEARS

Practical shear design based on the principle "a chain is as strong as its weakest link" is featured in All-Alloy Portable Hand Shears manufactured by the Bremil Mfg. Co.

Two sizes meet all portable requirements. The No. 1 shear, for the Artisan,



will cut up to No. 11 gauge. This gives it a range well within the requirements of the average sheet metal worker. The shears weigh 22 lbs. It is an ideal portable tool on any job away from the shop as well as on the work bench.

The No. 2 shear which has successively operated on  $\frac{1}{4}$ " thick .40 carbon stock, weighs 28 pounds.

Bremil All-Alloy shears are equipped with removable cutting blades made from Alloy (shear blade) steel which has been properly heat treated, machined and surface ground to assure accuracy and high cutting efficiency.

More complete information on these shears may be obtained by writing the Bremil Mfg. Co., 1215 Pittsburgh Ave., Erie, Pa.

#### DRAFTING INSTRUMENTS

"Instrumaster" is the brand name of a new line of Drafting Instruments.

One series consists of 5 stencils for Axonometric Drawing which greatly simplify and improve the draftsman's work. One item is intended for making isometric drawings and contains 27 ellipse openings representing circles from  $\frac{1}{8}$ " to 2" diameter. Three edges at proper angles have inch graduations at required scales, so that the whole drawing can be made with

this one instrument. Another item is the counterpart for dimetric drawings 1:1: $\frac{1}{2}$ . Hi-Range stencils of same type, isometric and dimetric, with ellipses from  $\frac{3}{4}$ " to 4", complete this series.

An accessory is the Gilmour—"Instrumaster" Isometric Protractor, enabling the draftsman to plot and to measure angles directly in any one of the isometric planes.

The "Instrumaster" Hatching Stencils simplify Cross-Hatching. Precisely spaced slots at 45° guide the pencil, line markings between slots provide for wide variety of line spacing. The slanted side edges enable the user to hatch at 30° or 60° to the horizontal without separate triangles. Exact location of hatch lines can be pre-determined so as not to interfere with other lines of the drawing. Available in 5" x 6" and 6" x 8" sizes.

A 20-page illustrated booklet on "Axonometric Drawing . . . the universal picture language" explaining the fundamentals of three-dimensional illustration and its advantages is obtainable from Instrumaster Industries, Inc., Dept. BB, Arch St., Greenwich, Conn., at 10c for postage and handling.

#### SAFETY STEEL STAMP

An entirely new Safety steel stamp design, designated as "Nu-Grip", is announced by the M. E. Cunningham Co. The newly designed stamp is made of the Company's Mecco Safety Steel, and is claimed to incorporate all the advantages of positive grip at a more economical cost.

"Nu-Grip" stamps feature a counter-sunk hole on all four sides of stamps. The design of the hole has been engineered as an exact contour to assure the operator of a positive grip, and a "feel of security" when stamps are struck by severest hammer blows. Grip holes are positioned on stamps at exact center point for perfect balance.

"Nu-Grip" Safety stamps are built for long service life, and are available in all standard sizes from  $1/32$ " up to and including 1". Characters are engraved on standard heavy duty blanks, and therefore, are adaptable for all kinds of stamping applications, including marking of tough alloy steels.

For complete data, sizes and prices of "Nu-Grip" stamps, write M. E. Cunningham Co., 228 E. Carson St., Pittsburgh, Pa.

## ADVANCE IN TURNING, BORING & FACING OF IRREGULAR CONTOUR WORK

An outstanding advance in the art of contour work is that made possible in a



new mechanism which Monarch Machine Tool Co. of Sidney, Ohio, has called the "Air-Tracer". Under an exclusive license from The Bailey Meter Company, Cleveland, Ohio, who first introduced the device two years ago, Monarch has improved upon the design of the control. The unit may be attached to any new 14, 16, 18, or 20 inch Monarch Toolmaker or Engine lathe. Other applications of the equipment will follow.

The device combines an "Air-Tracer" with a hydraulically operated power circuit which they claim will produce work pieces with contours which match those of a master template within a limit of tenths. Also, since the motion of the cutting tool is stepless, increasing contours can be produced with a finish not possible heretofore.

The "Air-Tracer" may be used for any increasing contour or multiple diameter work. Mandrels, punches, dies, spinning chucks, valves, metering pins, nozzles, impellers, molds, and step shafts are typical examples of the kind of work for which it is ideal. Diameters, tapers, square shoulders, necks, and radii on a step shaft may be turned in a single cut.

As the new device provides accurate sizing automatically, the company reports, the need for making several set-ups and taking numerous and repetitive measurements is eliminated. This substantially reduces production time. An added advantage when step shafts are being turned is the reduction of grinding stock because of the closer tolerances maintained. The fine finish obtained frequently eliminates a hand-polishing operation.

Thin metal templates may be used because pressure of the tracer against the

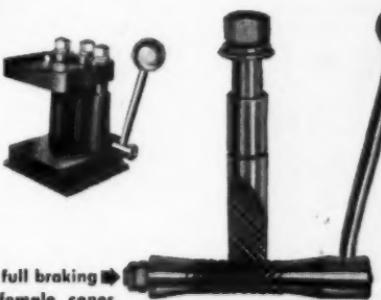
## "CONE-LOK" JIGS

- MECHANICAL SIMPLICITY
  - ADAPTABILITY
- RUGGED CONSTRUCTION
- CHIP PROTECTION
- SEALED LUBRICANT
- MAXIMUM SAFETY

The Woodworth "CONE-LOK" jig utilizes the full braking power of its perfectly mated male and female cones.

ACCURACY  
YOU CAN TRUST

★ CATALOG AND FULL SCALE TEMPLATES UPON REQUEST ★



# WOODWORTH

N. A. WOODWORTH CO., SALES DIVISION • 1300 E. NINE MILE RD., DETROIT 20, MICH.

template is only a few ounces. When certain types of straight shaft work are being turned, it is even unnecessary to provide the conventional template. In its stead, a master work piece, held between centers attached to the template support, may be used.

Write Dept. BB of the company for details of operation, etc.

#### NON-CUSHION TYPE AIR CYLINDERS

The Modernair Corporation has begun national marketing of a new line of non-cushion type air cylinders, complementing the presently manufactured and distributed line of cushioned-type cylinders. The Modernair unit is said to offer diversified use thru the incorporation of several new features. Most prominent design factor is the utilization of threaded cylinder caps, sand cast of aluminum alloy and heat treated for high tensile strength and pressure resistance. This is to eliminate tie-rods for a positive seal between the caps and the seamless brass cylinder barrel. Another feature pointed out is the fact that the Modernair unit permits the caps to be rotated a full 360° on the cylinder without affecting the permanence of the seal. This eliminates,

in most cases, the need for elbow or "T" fittings in connecting the line into or from the cylinder. Another point is the use of aircraft type "O" ring packings



thruout the cylinder. This feature is to prevent metal-to-metal contact at any point of wear.

This cylinder is produced in a standard range of 2", 2½", 3" and 4" diameters, the stroke length is optional. The basic cylinder can be actuated by air, water, or oil with equal ease and freedom from operational failure.

The cylinder caps are designed to take any one of several available brackets or combination of brackets. Essentially these

**MILL IT  
ON YOUR LATHE**

**PALMGREN**

**MILLING ATTACHMENT**

NOW—you can do milling, slotting, grinding, grooving, squaring shafts, sawing at angles, and many other important operations on your lathe. PALMGREN MILLING ATTACHMENT is a necessary fixture for small shops, schools and emergency work in large plants. Fits South Bend, Atlas, Craftsman, Logan, Sheldon and all other makes. It has graduation for rotary angle adjustments, also graduated feed and adjustment screw. Easily mounted by straddling lathe's regular tool post. Try one—it will quickly pay for itself.

**IMMEDIATE DELIVERY**

No.	Width	Depth	Jaws	Weight	Base	Price
	Jaws	Jaws	Open	Pounds	Opening	F.O.B.
150	1 1/2"	1"	1 1/8"	6 1/2	1"	\$18.75
250	2 1/2"	1 7/8"	2 1/2"	11	1 1/4"	24.75
400	4"	1 1/2"	4"	25	2"	39.75

Order from your dealer or jobber. Write for circular No. 350.

**CHICAGO TOOL AND ENGINEERING CO.**

Mfrs. of PALMGREN PRODUCTS for over 29 Years

8384 South Chicago Avenue

Chicago 17, Illinois

WHEREVER HOLES  
ARE BORED

You need low-cost  
**OPTI-LOCATOR!**

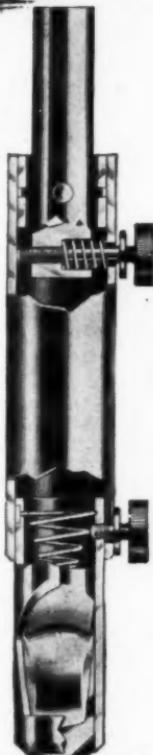
**OPTI-LOCATOR —**

Visually aligns reference marks to axis of spindle rotation.

► Corrects for spindle runout.

► Makes all locating problems simple, accurate, positive.

► Can be used on any machine tool for greater precision in boring, measuring or locating.



Write for Free Folder illustrating simple operation and many uses!

**THE BENTON CO.**

DEPT. H, 351 S. LA BREA AVE.,  
LOS ANGELES 36, CALIF.

MANUFACTURERS OF OPTI-TOOLS

TO KEEP - - -

**MACHINISTS FROM WASTING TIME**

You can eliminate many hours of highly-paid Machinist's time from your payroll, if you will let these men use the Jackson TIME-SAVING Vise. It cuts out the time they are forced to waste hunting for Bolts, Clamps, Angle-Plates, Parallel-Strips, etc., when "rigging up" work on the Drill Press, Miller, etc. Furthermore, you can eliminate the simultaneous loss of output and overhead expense incidental to having your productive machine idle during the "rigging up" process. The four-side turret jaw and supplementary jaws enable the vise to hold instantly the thousand-and-one shapes that arise in a Machine Shop.



Send for Bulletin No. 23-B  
Describing the

**JACKSON TIME-SAVING VISE**

**BROWN ENGINEERING CO.**

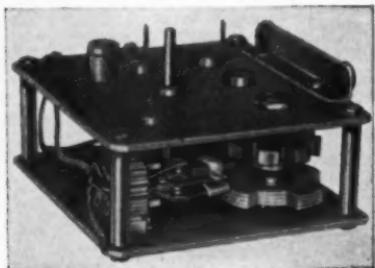
126 N. THIRD ST. READING, PA.

mounting brackets are: end plate, foot bracket, and swivel mounting. Combinations are possible to suit the requirements of multiple installations.

A fully descriptive engineering bulletin may be obtained from: Modernair Corp., 4222 Hollis St., Oakland 8, Cal.

#### IMPROVEMENTS IN CONSTANT SPEED D-C MOTOR

An improved model of the Constant Speed D-C Motor which according to the manufacturer, virtually antiquates the year-old original, has been developed by



the Amglo Corp. The new motor is claimed to be adapted to many uses heretofore beyond the scope of the d-c field, particularly in industrial and commercial applications where synchronous units are required.

Approved by the Bureau of Standards, the FCC, and CAA, the new model utilizes the principle of polarized magnetic drive of a vibrating reed, the nucleus of speed control under d-c power. This results in a powerful attraction and repulsion force which assures immediate self-starting at all times, as well as much longer periods of operation without maintenance, the manufacturer states.

#### STANDARD PARTS



FOR  
JIGS, FIXTURES,  
DIES, GAGES, TOOLS  
AND MACHINERY

Featuring  
Hand Knobs, Quarter Turn Screws, Spherical Washers, "C" Washers, Jig Feet - Locating Keys  
Write for Catalog No. 2  
Inquiries for Tool Die and Mold Estimates Invited.

GEORGE F. BUB AND SON  
11413 MADISON AVE. CLEVELAND 2, OHIO

The Amglo Corp. reports that:

1—When tested under actual working conditions, and in numerous government and commercial laboratories, the new model maintained constant speeds regardless of wide variations in voltage.

2—It was completely self-starting, attaining full speed almost instantly, and exhibited marked increases in operating efficiency.

3—The motor's current consumption varied from .06 to 1 watt, either from battery or direct current line sources. Shaft speeds were geared from one revolution each 24 hours to 100 rpm., providing clock-like accuracy previously possible only with a-c units.

The new model remains small enough to be held in the palm of the hand, the available for use at 3, 6, 12, 24, 32, or 110 volts.

For complete information on the new Amglo Constant Speed D-C Motor, write for illustrated literature and technical data to the Amglo Corp., 4234 Lincoln Ave., Chicago 18, Ill.

#### CARBIDE TIPPED MASONRY DRILLS

For drilling non-metallic materials 75% faster, Vascoloy-Ramet Corp., Dept. BB, North Chicago, Ill., announces its new line of Red Streak carbide tipped masonry drills.

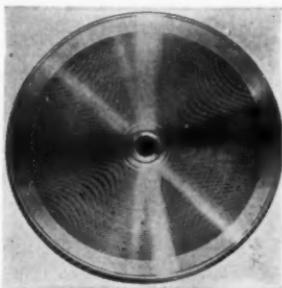


Constructed with generous sized carbide tips, the drills are obtainable in off-set and straight shank designs in drill diameters of .196 to 1.535.

Adaptable for any rotary powered or hand drill, the Red Streak masonry drills are specifically designed to drill concrete, brick, tile, slate and all other non-metallic materials, in addition to eliminating premature drill wear, excessive drilling time and noisy percussion hammering encountered in previous drilling practices.

### ROTARY MAGNETIC CHUCK

A new all purpose Rotary Magnetic Chuck which is reported to have all the characteristics of previous designs with a



few added advantages has been announced by the O. S. Walker Co., Inc., Dept. BB, Worcester 6, Mass.

This chuck is adaptable for both small and large pieces. It is also suitable for auxiliary plates adaptation.

This company has engineering services available for all concerns interested in this line of products. They manufacture magnetic chucks and grinding machines.

For further details write directly to the manufacturer.

### TWO SERVICE FITTINGS

Two new service fittings for high and low potential wiring designed expressly



for use with the company's underfloor wiring duct have been announced by National Electric Products Corp., Dept. BB, Chamber of Commerce Bldg., Pittsburgh, Pa.

Service Fitting No. 7903, with its stand-

*Anderson*

## CARBOLOY TIPPED SCRAPER BLADES

Speed up scraping operations with these efficient blades. They are especially good for hard alloy iron and the extremely hard bronze castings. If you are already using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove the high-speed steel blade and slip in the Anderson Carboloy Tipped Blade. They are available in three widths.



THEY LAST 8 TO 10 TIMES LONGER



*Write for Bulletin No. 2-5*

**ANDERSON BROS. MFG. CO., Rockford, Ill.**

## ARTUS ARBOR SPACERS

The COLOR tells  
the THICKNESS



ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder.

### CONVENIENT TRIAL OFFER Handy Spacer Assortment

10 ea. .001 — .0125 thick  
5 ea. .015 — .030 thick

#### 100 SPACERS IN ALL

$\frac{7}{8}$ " — \$3.10     $1\frac{1}{4}$ " — \$3.80  
1" — 3.35     $1\frac{1}{2}$ " — 4.70

Other standard sizes also available.

Illustrated Folder Free.

Immediate Delivery on  
Spacers, Gaskets, Shims

### INDUSTRIAL PRODUCTS SUPPLIERS

106 Water Street, New York 5, New York

ard duplex T-slot receptacle, is to be used for high potential light and power wiring. Telephone, buzzer and inter-communication low potential wiring in plant offices and office buildings are serviced at the floor level with Service Fitting No. 7904.

Both models are component parts for the Necpduct underfloor wiring distribution system.

Of the same general appearance and construction, the service fittings are adapted to screw into standard outlets of the underfloor duct.

No. 7903 can be furnished with 3-pole twist-lock<sup>®</sup> receptacles instead of standard duplex, when specified. Telephone or signal wiring issues from No. 7904 thru a rounded composition bushing.

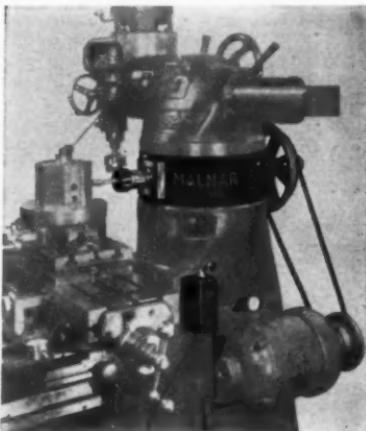
### HORIZONTAL UNIT MAKES BRIDGEPORT UNIVERSAL

The Malnar Horizontal Unit is designed to eliminate costly errors due to resetting from vertical to horizontal, and to be easily and permanently installed on any Bridgeport Turret Milling Machine. All jobs are done on one set-up. They may be worked vertically by the Bridgeport and horizontally by the Malnar.

The Malnar, it is claimed, runs vibra-

tion-free on Timken Roller Bearings, is rugged and strong enough for heavy end milling, fly cutting, boring, drilling and other minor operations.

For complete information, write for



Catalog No. MT-1 from Malnar Machine & Tool Company, Inc., 19301 St. Clair Ave., Cleveland 10, Ohio.

### GREAT INTEREST SHOWN IN LINCOLN FOUNDATION'S \$200,000 AWARD PROGRAM

Inquiries from every state of the union and from 27 foreign nations indicate an unprecedented interest in the \$200,000 Design-for-Progress Award Program sponsored by The James F. Lincoln Arc Welding Foundation of Cleveland, O., according to an announcement by that company.

This indicates the tremendous interest in welding stimulated in many cases by the part welding played in World War II.

The program having the double purpose of stimulating scientific research and design involving arc welding and of making the results of these studies available generally, closes on June 1st of 1947.

The present program provides 452 awards totalling \$200,000 for papers embracing every field of industry and research where arc welding may be applied, and in scope is comprised of 15 classifications and 43 divisions which have been established to permit wider participation for the entrants.

This award program was described in the June issue of MACHINE TOOL BLUE BOOK.

## aid in combating corrosion or scale

For a commercial, institutional or industrial establishment having corrosion or scale water troubles in hot water or cooling water systems—whether it uses 13,000 or 1,000,000 gallons per month—CAlgton, Inc. of Pittsburgh has developed a new series of Micromet feeders by which the chemical can be fed into the water lines with simplicity and low cost.

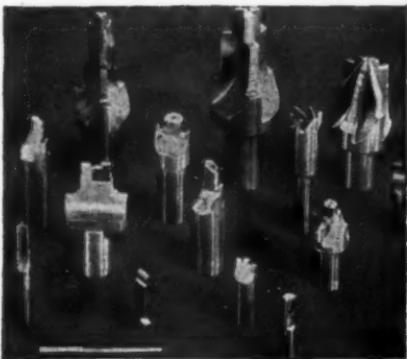
The amount of chemical required—and the size of feeder—depend on the type of water trouble encountered and the amount of water to be treated. For corrosion the 50-pound feeder, for example, will handle up to 150,000 gallons of water per month. For hard waters producing lime scale it will handle up to 300,000 gallons. The larger feeder will handle up to 1,000,000 gallons of scale-producing water per month. The smaller type feeders will handle as low as 3,000 gallons per month.

Micromet also is of value in air-conditioning systems where evaporative condensers and coolers tend to scale up or corrode.



## FORM-GRINDING

... is our business!



• Your own products are *your* specialty. Why not let us form-grind the illustrated types of form flat-drills in which *we* specialize?

Our entire organization is keenly interested in "Form-Grinding" and its problems. Facilities include J. & S. "Form-Dressers," J. & S. "Form-Grinders," and all necessary form-grinding equipment. The "know-how" developed by supplying some of the outstanding manufacturers in industry, is available for your quality tool requirements—and at competitive prices. Your requests for quotation are solicited on that basis.

Write for booklet or send prints today!

*J & S* **TOOL CO.** 477 Main St., East Orange 2, N. J.  
Manufacturers of "Fluidmation" Radii and Angle Dressers

# FRONT LEVER BENCH PUNCH



STURDY  
•  
DURABLE  
•  
HANDY

Capacity:  $\frac{7}{16}$ " hole through  $\frac{1}{4}$ " steel or  
 $\frac{3}{8}$ " hole through  
 $\frac{5}{16}$ " steel.

Immediate shipment.

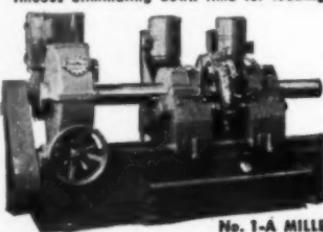
Punches and dies are carried in stock in a large range of round, square, flat, and oval sizes.

Catalog No. 8 available

T. H. LEWTHWAITE MACHINE CO.  
 311 East 47th St. New York 17, N. Y.

## Roto-Matic MACHINE TOOLS

• A combination of precision workmanship and advanced design contribute to the quality of output and quantity of work pieces produced on Roto-Matics. Production far exceeds that of standardized equipment used in the metal working industries today, because practically all operations are continuous eliminating down time for loading.



No. 1-A MILLER

Catalogue B-90 illustrating and describing various types of drilling, milling, reaming, and boring machines is available on request.

DAVIS & THOMPSON CO.  
 MFRS. OF MACHINE TOOLS & MICROMETERS  
 MILWAUKEE, WISCONSIN

## SWISS MADE MILLING MACHINE

The Swisma Vertical Milling Machine is designed for faster machining of dies and hundreds of other precision parts. It



will mill vertical surfaces or drill round, square and hexagonal holes in metal or plastic.

This machine is distributed by the Gubelin International Corp., 336 Park Ave., New York 22, N. Y. They report that this machine will do production jobs with a maximum of precision at a minimum cost.

The following three points are stated as the main reasons for the machine's economical operation:

1—an unskilled man may become an expert operator in a few hours.

2-The machine is accurate in all of its component parts.

3-The machine permits tool engineers and designers a freer hand on the drawing board.

The machine is built in Switzerland and is asserted to have a high precision standard. Extra accessories and regular accessories are also available.

Bulletin 101 describing this machine and its conversion to a precision drilling machine may be had by writing to Dept. BB of the Gubelin International Corp.

## DATA BOOK ON ALUMINUM ALLOYS AND MILL PRODUCTS

Due to the demand for technical information on aluminum alloys, Reynolds Metals Company has published a 248-page book featuring 106 tables of technical data. After describing briefly the history of aluminum, the book discusses alloy tempers, physical properties and presents detailed data on chemical, physical and mechanical properties of high purity aluminum; with nominal chemical compositions, typical mechanical properties, etc.

Subsequent chapters then take up various mill products, covering such subjects as manufacturing methods, alloys and tempers in which that product is made, identification, packing, ordering data, commercial and standard sizes.

A novel feature of the book is the color index scheme employed to facilitate location of the various material. A color flag appears on each 2-page spread that ties in with a color index in the front of the book to speed the locating of any particular section wanted.

It contains a detailed table of contents, a thorough cross index, and a separate listing of the 106 tables. The books are available from Reynolds Metals Company, Dept. 47,

2500 So. Third St., Louisville 1, Ky. Price \$2.00.

### SWISS MADE CALIPER

The No. 17 Roch Vernier Caliper has been announced by the Park Sales Co., 417 Canal St., New York 13, N. Y. This company states that this caliper is made by the Swiss precision instrument maker, P. Roch. It is asserted to be made of very fine rustless hardened steel which combines extreme accuracy and durability.

Among the special features pointed out are:

1—Inside and outside measurements are obtainable with knife edges.

2—Construction is entirely of stainless tempered steel.

3—Readings can be made in 1/1000". This is supplied in metric and English reading or English only.

4—Quick acting precision lock manipulated by a thumb screw.

5—Precision and accuracy of a fine watch.

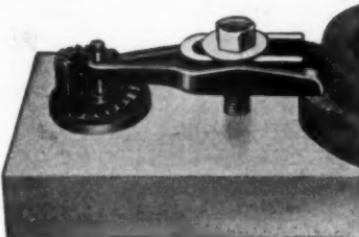
This company also has other precision measurement instruments available. Among these are micrometers, test gauges with adjusting rules, and many models of their various products.

Illustrated literature is available from the Park Sales Co.

## Reduce Set-Up Time — Speed Production

### WITH K-O ADJUSTABLE U-CLAMPS

Turning step elevation base quickly adjusts clamp to work height. Three-point contact assures uniform pressure, strong grip. Made in six sizes—three styles. **Write today** for circular and prices.



No. 4 U-Clamp with  $\frac{3}{4}$ " bolt — \$1.60

**K-O PRODUCTS CO. BENTON HARBOR, MICH.**

**RUNAWAY PAYROLLS  
HARNESSED BY  
IMPROVED  
TOOLS**

Hand Sawing of  
Hard-to-Cut Auto-  
motive Alloy Steels  
Speeded up with  
Technite Hand Hack  
Saw Blades.

**T**HIS is the blade the automotive industry has found tops. If you expect a good workman to do a good job, don't hand him an ordinary blade. Equip him with *Technite*.

**Y**OU also increase efficiency on machine production when you use this same blade in the power sizes. Ask our Distributor to give you full details.

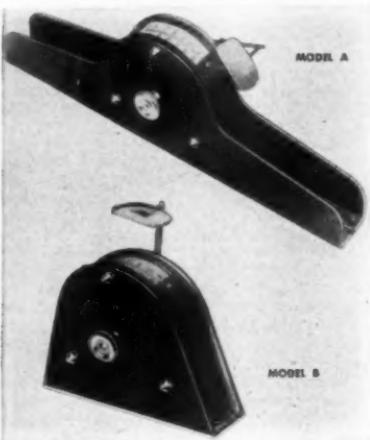
**THE CAPEWELL MFG. CO.  
HARTFORD 2, CONN.**

METAL WORKING CRAFTSMEN FOR OVER 65 YEARS



#### NEW "ANGLES" ON VERNIER ANGLE GAGE

Several new and important improvements on the Clinometer Vernier Angle Gage have been announced by Engis



Equipment Co., Dept. BB, 431 S. Dearborn St., Chicago.

This instrument is now made with an all-aluminum housing for lighter weight; a new special window for easier reading and improved stability; and other new mechanical features.

The Clinometer is used on various types of machine tools—lathes, drilling presses, shapers, gear hobbers, etc.—and for test set-ups in the inspection room. Models A and B shown in the illustrations are the two models recommended for general purpose. Other models are for specialized fields.

Action of the instrument is by a free swinging drum graduated 360°, supported by ball bearings. When the device is applied to an inclined surface, the drum swings to a position which brings its center of gravity under its center line. The degree of inclination can then be read from a pointer located above the drum.

#### INSTRUMENT DETECTS FLAWS

A flaw detector which can continuously detect and count holes, weak spots, and conducting paths in thin materials such

as paper, sheet rubber, sheet mica, varnished cloth, plastic materials, and enamel films on wire during the manufacturing process has been announced by the Special Products Division of the General Electric Co., Schenectady, N. Y. The new instrument permits quality standards to be set up close to the point of manufacture so that variations in quality can be quickly detected and correcting adjustments made with a minimum of waste. Applications include detecting places of low dielectric strength in insulating materials, and holes in materials which must resist the passage of light or air.

The new flaw detector can be applied to sheet materials up to .025" thick moving as fast as 450 ft. per. min. and to wire moving up to 100 ft. per min. It consists of an electrode assembly thru which an adjustable voltage is applied to the material undergoing test, and an electronic circuit which indicates the flow of current thru the material which occurs when a flaw passes under the electrode. Electrodes have been especially designed for use with specific materials.

The new flaw detector can be made to sound an alarm, operate a recorder, or shut down the manufacturing process

when flaws are encountered, and can be arranged to indicate when flaws exceed a given total. The control unit may be mounted remotely, where an operator can read the counter or watch for flashes of a flaw-indicating red light.

#### WIRE STRIPPING MACHINE

The Codeco wire stripping machine, which cuts, strips, and slits one, two and three conductor wire up to one half inch diameter, is announced by The Williams Products Co., Middletown, Conn.

This bench machine can be used by large and small manufacturers for production, semi-production, or custom work. One or all of the three basic operations are performed simultaneously on both ends of the cord.

The stripper is operated by compressed air. Sixty pounds air pressure will operate the machine to process most cord. All stripped material is removed automatically. The Codeco machine requires no bolts, screws or lugs. Measures 18" wide, 11" deep, 25" high and weighs approximately seventy-five pounds. Illustrated folder and prices available on request to Dept. BB.



**If you want  
MORE PARTS per hour  
LOWER COST per part**

the BARKER WRENCHLESS CHUCK can do it faster, better and stand up to it longer. Where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine, these Chucks will increase production and pay for themselves in 60 to 90 days while

doing it. See how a Barker Wrenchless Two-Jaw or Three-Jaw Chuck can speed up production in YOUR plant.

*Write for bulletin 201 today*

*— Chuck Division —*  
**THOMAS HOIST CO.**  
205. HOYNE CHICAGO 12

# Long Recognized for durability strength and service



• The new improved Series A Robinson Punch Presses retain all the sturdy characteristics of their predecessors with added safety, speed, strength and ease of operation and maintenance. Available in five sizes.

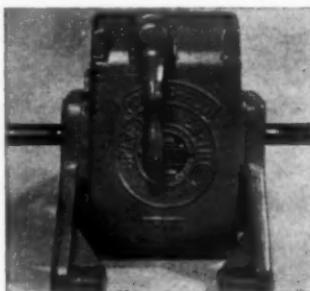
Send for descriptive Bulletin No. 7.

**New Albany Machine Mfg. Co.**  
New Albany, Indiana, U.S.A.



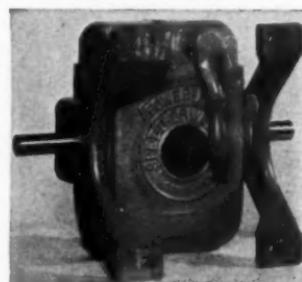
## ORGANIZATION OF NEW MANUFACTURING COMPANY

A new company has recently been organized to manufacture a complete line of selective speed drives and speed reducers. This is Speed-Drives, Inc., 23215 Hoover Rd., E. Detroit, Mich. This company will use the trade name "Power-Flo."



These drives will be made with 4 speed ratios: 1:1, 1 1/4:1, 3:1, and 4:1. They will be available in sizes from 1/2 hp to 20 hp. They assert that each product is precision made and readily adaptable to new machines or may be built for machines now in use.

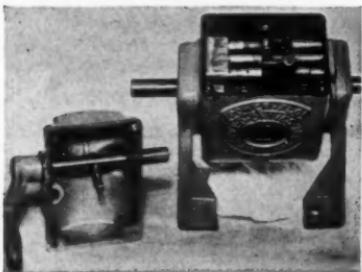
Clutch models are available from 3 to 10 horsepower.



These Power-Flo drives are said to incorporate the following advantages: position-locked shaft and bearing end-play control, selective bell-end mounting positions, adequate speed ratios, dependable leak-proof oil seals, compact streamlined design, and other points of importance.

The shifting mechanism is designed to insure positive full mesh of gears in each

position. It incorporates a ball and spring-locked shifting mechanism which is precision fitted in the case so that it will not become distorted or misaligned by clashing or partial engagement of the gears.



The bell-end mounting positions permit the drive to be mounted on the bottom, top, front or back without changing the upright position of the case or shifting arm.

Illustrated material including diagrams may be obtained by writing to Dept. BB of Speed-Drives, Inc.

#### METALLURGICAL SERVICE LABORATORY AVAILABLE TO INDUSTRY

A new, thoroly modern Metallurgical Service Laboratory has been put into operation by Ajax Electric Company, Inc., Dept. BB, Philadelphia manufacturer of Ajax-Hultgren Electric Salt Bath Furnaces. The laboratory, which is considered a model salt bath installation, contains a battery of seven Ajax furnaces, with accompanying quench tanks, acid pickling tanks, rinse tanks and a drying oven—all of commercial proportions—permitting the treatment of virtually any normal size of work by any process for which salt bath furnaces are used.

The sole purpose of the new laboratory and its staff, the company reports, is to make it possible for metallurgists and production men concerned with heat treating to obtain a direct comparison between the physical characteristics resulting from salt bath heat treating and those resulting from other methods—without the necessity of making a large capital investment or, in fact, obligating themselves or their companies in any way. No charge is made for treating specimen work submitted by any bona fide production executive or metallurgist. No commercial heat treating work will be done.

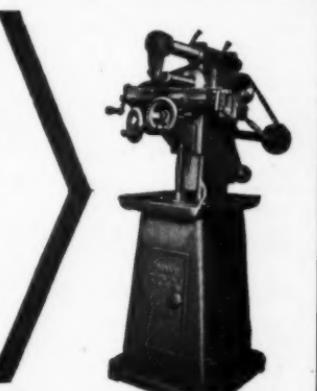
## MILLING — BURKE — MACHINES —

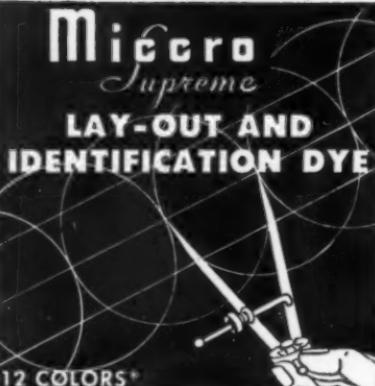
### **Put Your Small, Difficult Work ON A PRODUCTION BASIS!**

- Burke Milling Machines are fast, economical and indispensable in shops handling small, difficult work.
- 4 Types TO MEET YOUR REQUIREMENTS — Nos. 1, 2, 3, and 4.
- Motor Driven for Fast, Economical Production.
- Timken Roller or Ball Bearings to Spindle.
- A Number of Attachments Available: Vertical Milling Attachment; Index Centers; Vises—3 types, including swivel base.

WRITE FOR COMPLETE INFORMATION

**BURKE MACHINE TOOL CO. 510 Sandusky St., Conneaut, O.**





12 COLORS\*

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of stock and parts . . . Shows up in sharp relief—dries instantly—easily removed . . . Write for circular.

\*Purple shipped unless otherwise specified

**MICHIGAN CHROME &  
CHEMICAL COMPANY**

8340 E. Jefferson Ave. • Detroit 7, Mich.

#### MULTIPLE SPINDLE WORK HEADS

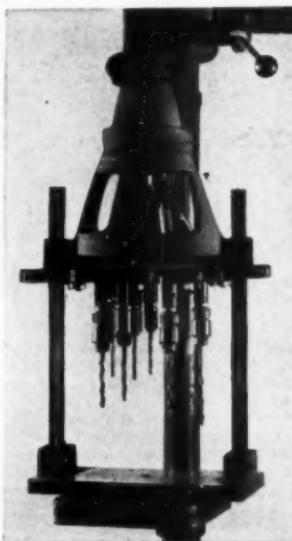
A complete line of standardized Multiple Spindle Work Heads for drilling, spot facing, reaming, tapping, etc., having from 2 to 12 individually adjustable spindles was recently announced by International Research Corp., 659 S. Anderson St., Los Angeles, California.

Where the former models had a maximum of 8 adjustable spindles they now have models having up to 12 spindles. Several new spindle arrangements are also available now which are applicable to all models.

These new units are designed to in-

crease the center distance of standard I R C Work Heads and broaden the field of application to include the production of parts formerly too large to be handled by Multiple Spindle Heads.

Another new product offered is a speed



increasing and reverse gear unit which is installed between the spindle gear box and the quill clamping bracket. This device is used on larger drill presses where the spindle speed is too slow for small drills. The reverse rotation makes it possible to use the regular drill press feed mechanism without alteration.

Illustrated literature, price and dimension sheets are available on request.

#### NOW -- IMMEDIATE DELIVERY on the ALLMAN PRECISION TAPPER

You can get your Allman Universal Precision Tapping Fixture immediately. Avail yourself of this opportunity. This standard piece of equipment is needed by every shop that does hand tapping. So simple, the newest apprentice can operate it right away. Tap any angle from 0° to 90°. Cut down spoilage and rejects due to faulty tapping. Reduce tap breakage. Write today for free illustrated bulletin and prices.

**WOLCO TOOL DIVISION 725 Custer Ave.  
Evanston, Ill.**





Plain Type



TRADE



Offset Type

# CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS OFFSET.

AUTO MOULDING  
& MFG. CO.

1110 E. 87TH ST.  
CHICAGO 19, ILL.

SPECIFICATIONS:  
Open Width  $\frac{3}{8}$ " to 6"  
Gate Material .040 to .125  
Pin Diameter .101 to  $\frac{3}{8}$ "  
Lengths to 120"

SEMI-OFFSET

## SPIRAL FORM TOOLS FORM-GROUND TO ORDER

Using equipment designed by their own engineers exclusively for the Company's use, the J. & S. Tool Co., 477 Main St., East Orange, N. J., form-grind spiral form tools and spiral fluted form drills to customers' specifications in unusually few man-hours.

The grinding technique, employed in this shop is the outgrowth of years of concentrated experience in form-grinding operations. They say their spiral form tools are highly rated by many manufacturers for their exceptionally long life, strength and free cutting qualities. However, hitherto their high cost has made extensive application impracticable. Improved methods of the J. & S. Tool Company greatly reduced their cost so that they are put within the reach of a much wider segment of industry.

### CARBIDE TIPPED TOOLS

When high speed steel tools proved to be too slow for re-surfacing worn and burned-out calender rolls, the Bryant Paper Co., of Kalamazoo, Michigan, reports they solved the problem of avoiding the necessity of grinding the rolls, by changing to tools tipped with Carboloy

cemented carbide. These tools—produced in standard sizes and shapes by Carboloy Company, Inc., 11139 E. 8 Mile Blvd., Detroit, Michigan—are being used "as received" at Bryant for turning the calender rolls made of compressed cotton.

Diameters of the rolls at Bryant Paper Company range from 15" to 18", length of rolls runs from 64" to 164". The company has 13 stacks, each machine containing six calender rolls, giving a total of 78 rolls of various sizes to keep in condition. When in use in the calender stack, pressure on the cotton roll is 1500 pounds per inch along its entire length, giving as much as 246,000 pounds total pressure on the longest rolls.

In an effort to speed up operation, the lathes were fitted with "standard" tools tipped with Carboloy Grade 883—a cemented carbide having great wear resistance and a good degree of toughness. Cutting speed with these tools on present equipment at Bryant is reported to be 180 SFPM with a feed of .015" to .020" per revolution.

To date, the Carboloy tools are said to have functioned so efficiently that Bryant has ordered new lathes—having 62" swing and 40' beds—so that full advantage can be taken of the Carboloy tools.



### WADE ENVELOPES

protect

Shop Orders, Drawings,  
Blueprints, etc.

Made in three styles, transparent, fibre, and metal backs. Non-inflammable acetate windows. Special style or size to order. Write for details.

### WADE INSTRUMENT COMPANY

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1422 E. 109th St., Dept. H, Cleveland, Ohio



### TRICO OILERS

Automatic, accurate, dependable lubrication . . . no guess-work, bearing failures, idle machines or waste. There's a type for every application.

WRITE FOR CATALOG

TRICO FUSE MFG. CO.  
Milwaukee, Wisconsin

# IDEAL'S

## Anglemaster Sine Vises

Precision Ultra

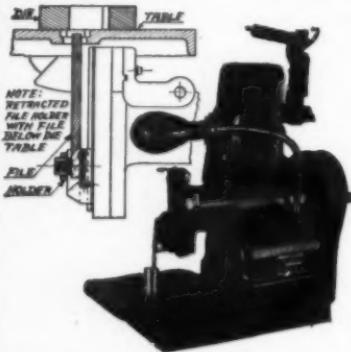


**NOTHING FASTER — for  
Surface Grinding, Inspection!**  
**NO CLAMPS! NO STRAPS!**

► Simultaneous squaring and paralleling  
of work —

► Fast, accurate angular set-ups.

## New Retractable DUPLEX Punch & Die Filing Machines



### Exclusive!

- No die lifting over file — especially heavy or small-hole dies.
- No accidental file breakage.
- Check work right on the die table.
- Leave overarm in set filing position.

## IDEAL TOOL AND DIE CO.

733-735 CONGRESS ST.  
SCHEMECTADY 3, NEW YORK

## ENGINEERING SERVICE AS A BUSINESS

Design Service Sales Co. Inc., located at 40 Exchange Place, New York City, consists of a group of Sales Engineers whose sole purpose is to supply a national organization with engineering and drafting work from manufacturers thruout the country. This engineering company is known as Design Service Company, with offices in New York, Newark, Cleveland, and Philadelphia. Its present employment is 400 engineers, architects, designers, and draftsmen; its scope of work begins with elementary engineering—such as tracing and detailing—and works its way thru tool design, mechanical and electrical design of large and complicated machinery, processing and engineering of tools, patent preparation drawings, designing and detailing of structural steel, plant and business surveys—in general, a complete engineering service.

Their one product is "correct information"—either in the form of surveys, or blueprints. It has very few contracts of long duration, most of the work being done on an hourly basis. For the past five years Design Service Company's staff has been kept busy week in and week out on intangible contracts which might last for a day, a week, or a year.

During the war Design Service Company worked on such projects as radar, jet propulsion, anti-aircraft, fire control instruments, and many other weapons of war; now, in peace time, their efforts are devoted to washing machines, refrigerators, watches, machinery for making milk containers, as well as designing of large plants and buildings thruout the country.

This company has a large group of experts in many different fields of engineering. These men are put to work on various projects on comparatively short notice. They offer manufacturers the aid of a complete engineering force when and where it is needed. They offer flexibility of ideas and methods, accurate work, and — most important — no overhead, from a manufacturer's point of view.

## CUSTOM MADE DEGREASERS

A method for efficient cleaning of metal parts and pieces is described in an 8-page booklet published by the Mechanical Process Co., South Orange, N. J. This company manufacturers the D'Oiler Degreasers.

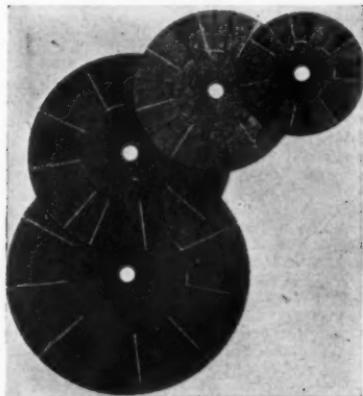
The company does not manufacture a "stock" degreaser. Each unit is designed and built to meet a specific need. They may be steam, electric, or gas-heated units. Construction is said to be very substantial and made of mill galvanized 10 gauge steel wherever feasible with heavy plate bottom construction.

The bench type degreasers may be made for small capacity requirements. Also available are degreasers for small, complex basketed parts and accessories.

Specifications and illustrations are included throughout the booklet, which may be obtained directly from Dept. BB of the manufacturer.

#### RIPPER CUT-OFF WHEEL

Designed on the same principle as the fast-cutting ripsaw used in woodworking, a new Ripper abrasive cut-off wheel has just been announced by American Emery

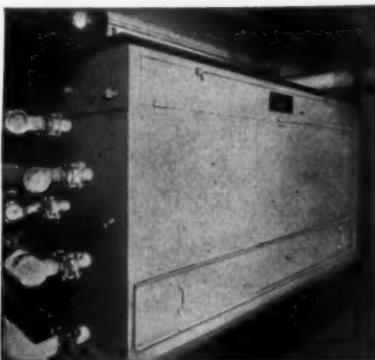


Wheel Works, Dept. BB, Richmond Sq., Providence 1, R. I. This new wheel is reported to have a "set" which allows it to cut cooler and faster—and last longer.

The sides of the wheel are made with radial depressions .006" to .008" deep, extending from the flange area to the edge of the wheel. Minimum thickness of wheel is 1/16" in 6" and 3/32" in 8", 10" and 12" sizes.

Manufactured in sizes 6" to 12" diameter in the "American" grit and grade to cut all materials from steel to stone. For full information address the manufacturer.

## Chilling Water or Liquids With Accurate Control of Temperature



Regardless of variation in cooling load or intermittent operation, the new Niagara Liquid Cooler holds delivered temperature accurately. Delivers fresh water at 33° F. constantly without danger of freezing damage and produces lower temperatures accurately in non-freezing chemical liquids and solution.

Capacity range is from 24 to 465 G.P.M. High capacity and fast chilling are provided in extremely compact space. Cooler is reliable and easy to maintain; all parts accessible for cleaning; insulation easily applied; operation is economical of power and refrigeration.

Write for Bulletin No. 100-MT.

### NIAGARA BLOWER COMPANY

Over 30 Years of Service in Industrial Air  
Engineering

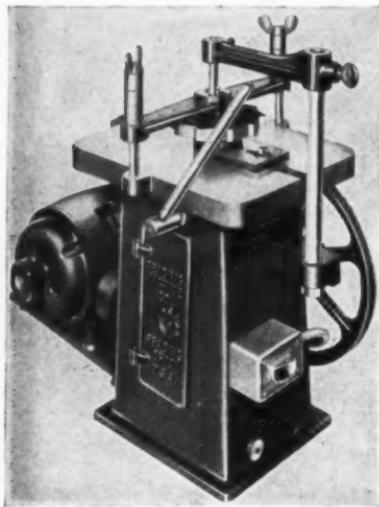
405 Lexington Ave., New York 17, N. Y.  
Field Engineering Offices in Principal Cities

**NIAGARA**  
AIR ENGINEERING EQUIPMENT

# TO RAISE PRODUCTION CUT COSTS

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## THE READING BROACH KEYSEATER



The Reading Bench Machine does not require bushings or guides. No other machine like it. Very fast—capacity from  $\frac{1}{8}$  to  $\frac{3}{8}$  cutter. Low first cost—prompt delivery.

**READING MACHINE CO.**  
READING (CINCINNATI) OHIO

### SELF - CONTAINED HYDRAULIC HOBBING PRESS

A 4-page bulletin has been published by the M & N Machine Tool Works, 149 Orono St., Clifton, N. J. The bulletin is



described as introducing a new idea. This company maintains they are presenting for the first time a completely self-contained Hydraulic Hobbing Press. Capacities range from 30 to 400 tons.

A special feature pointed out for this press is compactness of design. It has 4 columns, upward-moving platen—a completely self-contained unit with pump and motor in the base. A power connection is the only outside connection needed.

Once controls are set, the pressure is said to remain at the predetermined level constantly, regardless of the number of times the press is operated. Prompt response and absolute control of moving parts are also pointed out for the press.

The engineers of this company are prepared to help solve any problems in the selection of hydraulic hobbing presses. Special presses can be built to order or special equipment will be built for standard M & N presses.

---

### PORTABLE HARDNESS TESTER

A portable hardness tester has been introduced by the Ames Precision Machine Works, Waltham 54, Mass.

This instrument will test rounds and flats up to 1". Readings are made directly on the Rockwell scales with diamond and ball penetrators. Brinell readings may be easily transposed. It is designed for easy

## DRILL JIG **BUSHINGS**

A.S.A. STANDARD types and sizes in stock for immediate delivery.

Excellent delivery on NEW GAGES and GAGES salvaged by HARD CHROMIUM PLATING.

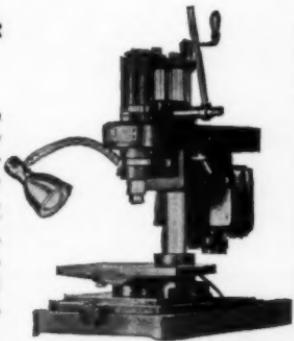
Write today for particulars



**ECONOMY TOOL & MACHINE CO.**  
MILWAUKEE 14, WISCONSIN

### DO TINY HOLES COMprise YOUR BIG PROBLEM?

Do tiny holes, .004" to .250" in diameter, comprise your big problem? Do you require a super sensitive drilling machine of rugged construction and close tolerances for intensive production work? One with ample clearances and travel, a wide range of spindle speeds, reasonable first cost and economical maintenance? Investigate, then, the Hamilton "Maxi-Jr. E" Super Sensitive Drilling Machine! You will find that it meets your requirements exactly. Write for illustrated literature containing specifications and price list. Address Department A-J.

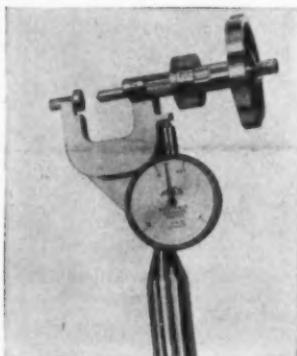


THE  
*Hamilton*  
TOOL COMPANY

SUPER-SENSITIVE DRILLING MACHINES  
TAPPING MACHINES • PORTELVATORS

NINTH STREET AT HANOVER • HAMILTON • OHIO • U • S • A

use and weighs less than 2 pounds. The necessary accessories are included with the tester and are packed in a durable wooden box.



Further illustrations and description, as well as instructions for operation are included in a booklet recently published. This booklet may be obtained from Dept. BB of the Ames Works.

#### VERSATILE DRILLING MACHINE

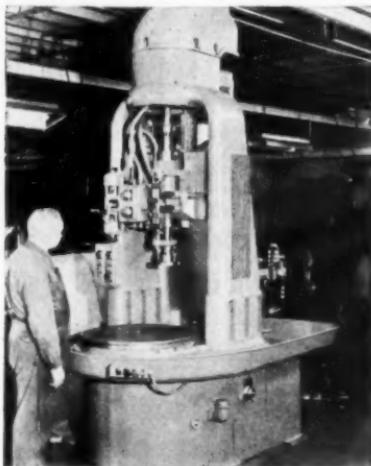
The machine illustrated here is known as the "Drill-O-Matic, and is designed for drilling, reaming, tapping, counterboring, countersinking, spot facing and flycutting.

The manufacturers report that this machine combines high production with low cost on indexed drilling operations with single tools or multiple spindles. Operation may be automatic or semi-automatic. Flexibility results from the large number of combinations of spindle and indexing operations which may be performed by a few adjustments and table substitution.

Operating cycles of the spindle and in-

dexing table are controlled by hydraulic equipment. The motor, pump, relief valves and tank are located in the base. All mechanisms and piping are readily accessible.

The spindle can be elevated to any desired height by addition of standard spacers. These spacers are machined for attaching Edlund Standard Cam Feed Units, special fixtures, jigs and tools. Angular drilling is also pointed out as an important feature of this machine.



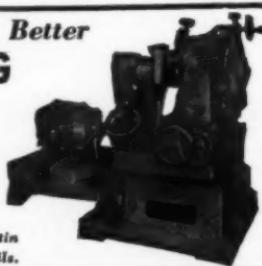
The capacity with back gears is  $1\frac{1}{2}$ " in steel. Diameter of the spindle at point of drive is  $1\frac{1}{8}$ ".

Bulletins describing and illustrating this machine and giving all the specifications of it may be had by writing to Dept. BB, Edlund Machinery Co. Inc., Cortland, N. Y.

#### More and Better FINISHING

at ...  
Lower  
Costs!

Let us send bulletin  
giving full details.



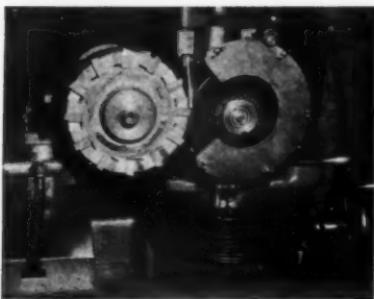
#### No. 101 CENTERLESS FEED POLISHING MACHINE

Gives any grade of finish to cylindrical work. Polishing wheel mount is heavy, with triple V-belt drive. Wheels can be trued in motion. Feeding speed is variable, the work support being adjustable with the feed unit. All parts are guarded but accessible. Construction is rigid and durable.

PRODUCTION MACHINE CO.  
GREENFIELD, MASS.

## RESIN BONDED DIAMOND WHEELS

A new addition to its line of abrasive wheels announced by Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J., are Resin Bonded Diamond Wheels for grinding carbides and carbide tipped tools.



An exclusive feature claimed for Manhattan Diamond Wheels is the special resin bond which has been developed not to load or glaze when coming in contact

with soft or hardened tool steel shanks of carbide tipped tools. The economy of this feature according to the manufacturer, is realized in full wheel life thru the elimination of dressing or lapping.

A complete line of wheel types and shapes is available in grit sizes from 60 to 400. Write to Dept. BB.

## CATALOG OF MANY PRODUCTS

A 96-page catalog filled with interesting and valuable information on their line of tools has been published by the George Scherr Company Inc.

The new catalog is divided into groupings as follows: laboratory instruments; machine tools such as toolroom, vertical and horizontal milling machines, a combination shaper and slotter, precision bench lathes and other types of machines; machinists' tools; measuring instruments; optical equipment; toolroom specialties such as magnetic chucks, etc. In addition, there is a section on transmission equipment and gears, couplings, chains, speed reducers, also new variable speed drives, V-belts and sheaves.

Write George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y., for your copy.

# BAKER KEYSEATER

*for Speed and Accuracy!*

Baker Model 0 Keyseater meets demands for speed, accuracy and alignment in the finished Keyseat. Soundly designed...sturdily built for trouble-free, long-life performance. Operated on the draw cut principle; equipped with a push-button controlled, non-reversing type, 2 HP, 1200 RPM motor, mounted on a pivoted base; crank action adjustable for setting stroke from 0 to 9". Capacity ample to cut Keyways in mild steel up to 9" long by 1" wide at a feed of .005". Write for bulletin.

**BAKER BROTHERS, INC.**  
**TOLEDO, OHIO**

**Drilling, Boring and Tapping Machines**



## LIFT-PLATFORM UNIT DEVELOPED FOR OBSERVATORIES HAS INDUSTRIAL APPLICATIONS

A new type of electrically operated observation platform unit has been built by the Elwell-Parker Electric Co., Dept. BB, Cleveland.

It has two platforms, one stationary at 5', the other may be raised automatically within a range of 8 feet above floor, providing for observation at 13 feet and adjustments at 15 feet. Built mainly of aluminum alloy and mounted on ball-bearing, rubber-tired wheels, it is easily moved by one man.

The new unit was installed recently in the Warner & Swasey Observatory of Case School of Applied Science, East Cleveland, O. Collaborating in its development were Dr. J. J. Nassau (seen in illustration) professor of astronomy and director of the observatory; S. K. Towson, president of Elwell-Parker, and company engineers.

The observatory houses the 24-36" Schmidt-type telescope, built in 1941 by Warner & Swasey. The telescope is used by many research workers and students. Also, hundreds of persons peer thru the telescope on visitor's nights.



---

## Cut Drill Grinding Costs 50% and More — Speed Production • BLACK DIAMOND DRILL GRINDERS • for small gauge and fractional drills



ONE Black Diamond Drill Grinder, in any average Plant, will meet all production demands for accurately ground Small Gauge and Fractional Drills.

On this machine, any apprentice becomes a skilled operator . . . produces quantities of sharp drills, ground to perfection . . . true centered . . . with lips of uniform length . . . correct angle and proper clearance for accurate drilling.

Black Diamond Grinders cut grinding costs to a new low . . . save expensive drills . . . reduce breakage . . . release skilled labor for more important work . . . quickly pay for themselves . . . and the Web Thinning attachment efficiently cuts for Notched, Colton, or Crank Shaft Points.

If you use small drills, singly or in gangs—you are losing time and money unless you have a Black Diamond Grinder on the job.

Write for full details.

**BLACK DIAMOND SAW & MACHINE WORKS, INC.**  
45 NORTH AVENUE

NATICK, MASSACHUSETTS



# Why BREAK 'em ?

HOW MUCH DOES IT COST YOU  
TO REPLACE BROKEN DRILLS,  
TAPS, REAMERS, ETC.?

Added to losses due to work spoilage, labor  
of extracting broken pieces and production  
line tie-ups, it can be a formidable total.

You can cut these mounting losses easily by the use of BUFFALO TORQUE CONTROL COUPLINGS. Adjusted at a fixed torque to perform a particular operation, these couplings automatically throw out when overloaded, thereby releasing the driving power thru the couplings themselves, but automatically re-engaging and re-assuming the driving power when the over-load has been removed.

Available in production and utility models, in sizes for all operations on drilling machines, lathes, turret lathes, boring mills, etc. Also manufactured as stud drivers, nut setters and transmission types.

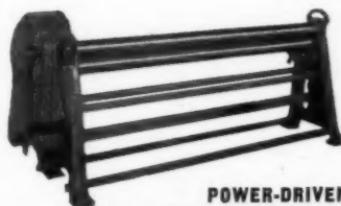


Machine Tool Type  
Production Model

*Descriptive Bulletin No. 1007 sent on request*

**BUFFALO MACHINERY CO., INC.**  
838 Grant Street Buffalo 13, New York

## LOW . . . . . SLIP ROLL FORMING MACHINES



POWER-DRIVEN  
NEW TYPE 4" DIAMETER

A sturdy, heavy-duty former with rolls of tough steel, turned and polished. Supplied complete with motor and drum type reversing switch. Sizes range from 38" to 98" roll length. All three rolls may be power driven if desired. Heavier and lighter machines also available. Write for details.

**SAN ANGELO  
FOUNDRY & MACHINERY COMPANY** **SAN ANGELO,  
TEXAS, U. S. A.**



**When You  
Make Them  
The HOVIS  
Way**



Simply invest in HOVIS UNIVERSAL MASTER WASHER DIES. Then 5

small easily removable parts are all you need to change to make a new size washer.

You can also use the Hovis Master Washer Die as a holder for making various blanks in your own die room, eliminating the cost of new die sets.

**HOVIS SCREWLOCK COMPANY**  
8096 E. Nine-Mile Rd. Van Dyke, Mich.  
Suburb of Detroit

**SCREW-HOLDING SCREWDRIVER**

A new Quick-Wedge Screw-Holding Screwdriver has been announced by the Kedman Co., Dept. BB, Salt Lake City, Utah. This is claimed to be a high quality precision tool for starting and driving



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EFFICIENT  
TOOL DESIGNING**

*means  
better production  
at a lower cost*

Efficient tool designing in post-war's competitive production is a "must". Our experience guarantees you tools — designed for economy of operation, resulting in your increased production at lower costs.

**COLUMBUS DIE • TOOL**  
*and Machine Co.*

930 CLEVELAND AVE., COLUMBUS 1 OHIO

screws. The hollow ground bit will hold a wide range of screw sizes.

The handle is made of Tennessee Eastman Tenite II, which is asserted to be shock proof and unbreakable. The method of use can be seen from the illustration.

Further information on this item may be had by writing direct to the manufacturer.

**ELECTRONIC CONTACTOR FOR  
RESISTANCE WELDERS**

For resistance welding jobs involving high speed operation or heavy primary currents of short duration, Square D Company offers a complete new line of electronic contactors using ignitron tubes. These electronic contactors are offered to supplement the Syncro-Break and High Speed magnetic contactors which are recommended where lower installed cost and economical operation are important factors and where welders must operate over a wide range of weld times and duty cycles.

Design of the new Class 8990 electronic contactors provides increased wiring space with power connections made near the

center of the enclosure allowing minimum bending of power cables. The contactor is assembled on a removable steel base plate. All control elements are

Bulletin 8990 describing Electronic, Syncro-Break and High Speed welder contactors can be obtained by writing Square D Co., Dept. BB, 4041 North Richards St., Milwaukee 12, Wis.



grouped at the righthand side away from tubes and cables and out of the path of any dripping from water condensation on tubes and hoses.

#### NEW ELECTRODE HOLDER

Substantial decrease in temperature operation, making possible greater efficiency and service economy, is claimed for the Little David, a new, light-weight, tong-



type electrode holder now on the market. The manufacturer reports that the Little David, rated at 350 amperes for rods up to and including  $\frac{1}{4}$ " in diameter, operates with a rise in temperature of only 50 degrees F., laboratory tests have shown. The holder is made of copper bearing aluminum alloy of the type generally used for aircraft production.

Advantages of the new holder, as

## HART'S Machine Vise Jaws



These Jaws are useful on any machine table. The angle holding the work down. Suitable to clamp or bolt to table. The hardened tool steel jaw measures 3"x6"  $\frac{1}{2}$ " thick angle edge serrated.

## HART'S Milling Fixtures

These fixtures will make themselves popular and profitable in your shop. Easily kept clean to receive the work. May be used in either horizontal or vertical position. Suitable to hold round, hexagonal, octagonal, or square stock, aligning the work with the machine. Grip holds the work on the bottom as well as on the back. Shipped in pairs, unless otherwise ordered. Made in 4 sizes —to hold stock from  $\frac{1}{2}$  to 5 inches.

**HART MACHINE CO.**  
26 MATHER ST., DORCHESTER, BOSTON, MASS.

*When writing for descriptive circular kindly mention the BLUE BOOK.*

pointed out by the manufacturers, are its slip-on insulating covers, overall insulation protecting both operator and equipment, and easy, on-the-job maintenance because of Allen head screws. For maximum current capacity, contact points on the jaws are extruded from 99.9 per cent pure hard copper.

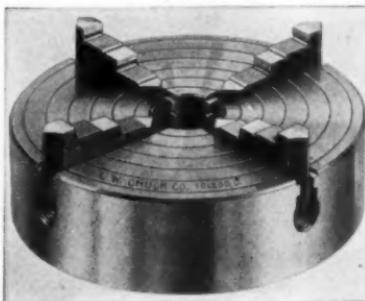
A soldered cable terminal is quickly released without removing the handle. A turn of an Allen screw head does the job. With only a .001 tolerance between the cable terminal and receptacle, an efficient electrical connection is assured. The holder weighs only 12 ounces. The Allen Wrench, the only tool needed to service the Little David, is contained inside the lower tong insulating cover when not in use.

A descriptive folder illustrating the Little David and its features can be obtained from The Lacey-Webber Co., Dept. BB, Kalamazoo, Mich.

#### NEW INDEPENDENT CHUCKS

New products in 4-jaw independent chucks for small lathes have just been announced by L-W Chuck Co., 23 S. St. Clair St., Toledo 4, Ohio. They report that rugged, accurately built 8" medium duty and 6" heavy duty chucks have been added to their line.

The bodies are semi-steel castings. The face and outer edge surfaces are ground and run true. The jaws are steel, the steps hardened and ground, and there are heat-treated steel screws. Both are furnished with wrench.

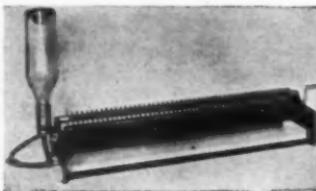


Also available for both new size chucks are completely finished, ready to mount adapter back plates with 1½"-8 thread suitable for some models of Atlas, South Bend and Logan lathes, and rough adapter back plate castings which can be machined to requirements.

## MAKE YOUR PRINTS IN A HURRY



Printer—up to 24" x 18" prints



Developer—No Trays—No Fuss

### with the NEW FOSTER PHOTO PRINTER

**FAST.** Makes crisp, blue or black line prints from paper or cloth tracings in less than five minutes. Don't hold up production waiting for prints. A battery of Fosters supplements central print departments in big companies. For small concerns, a single Foster is a time- and money-saver.

**ECONOMICAL.** Costs little to buy—little to operate. Requires no special operator. So simple anyone can turn out clear, sharp prints.

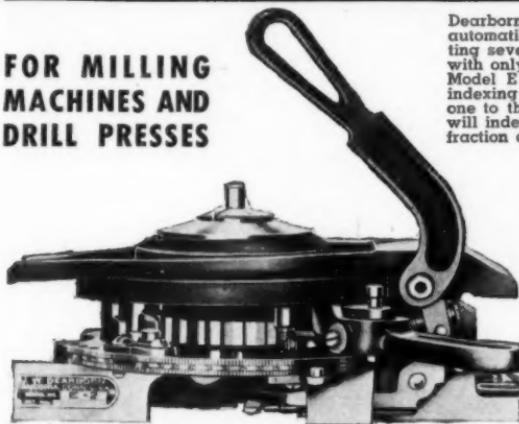
**VERSATILE.** This precision built printer handles sizes up to 24" x 18". Makes prints from tracings, hand written copy, printed sheets.

WRITE FOR ILLUSTRATED FOLDER

**FOSTER SALES CO.**  
4200 Woodward  
Dept. P Royal Oak, Mich.

## THE NEW DEARBORN MODEL "E" CHUCKING AND INDEXING FIXTURES

FOR MILLING  
MACHINES AND  
DRILL PRESSES



Dearborn fixtures meet every demand for automatic chucking and indexing, permitting several operations on the same piece with only one setting.

Model E is both a degree and a ratchet indexing fixture. It may be changed from one to the other in less than a minute. It will index any number of degrees or any fraction of a degree. Two adjustable stops are provided so that two angles can be obtained if necessary.

Work is held by collets which take up to and including 1" round,  $\frac{7}{8}$ " hexagon and  $\frac{3}{4}$ " square. Other shapes can be held with special collets.

Let us send bulletin giving full information.

**J. W. DEARBORN**

ANSONIA, CONN., U.S.A.

## ALMOND... *Triple Jaw* DRILL CHUCK

The Almond Three-Jaw Drill Chucks were pioneers in the field of drill chucks. Since 1872 they have played a necessary part in the logical procedure of machine developments.

Almond Chucks are furnished in nine sizes with capacities from  $3/16$  to 1". They are made for heavy and light duty types with taper or threaded arbor hole—to fit all machine tools and portable tools.



Write for complete details.

*The Original  
Manufacturers  
of Drill Chucks*

**T. R. ALMOND CO.**

ASHBURNHAM, MASS., U.S.A.

### SMALL SIZE DIE HEAD

The Eastern Machine Screw Corp., Dept. BB, New Haven 6, Conn., has issued a bulletin describing their 000 size of Style SAMA Die Head. This die head was just



being introduced before the war, but was discontinued until recently.

This head is designed for many applications on small screw and tapping machines. They are made of high speed steel, and the chasers are removable for re-grinding and resharpening by a simple operation.

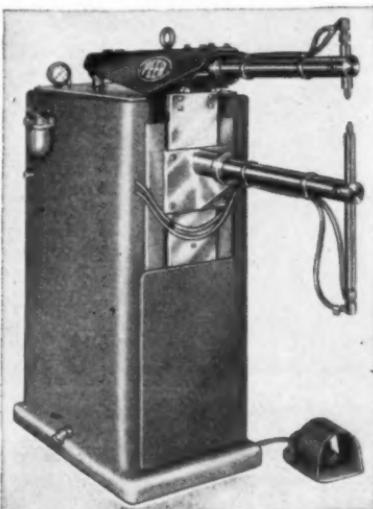
The 000 size is only  $1\frac{1}{8}$ " in diameter and 1" long. It has a capacity up to  $\frac{1}{4}$ " diameter and in pitches from 20 to 80. The head is designed to fit a No. 1 size holder which has a  $\frac{3}{4}$ "-24 thread.

Prices on these heads are also included in the bulletin, which may be had directly from the manufacturer.

### AUTOMATIC AIR - OPERATED ROCKER ARM TYPE SPOT WELDER

A new series of high speed, fully automatic air-operated, rocker arm, spot welders is announced by Pier Equipment Mfg. Co.

These new Series A-200 welders incorporate a double acting air cylinder of



ample size to provide the high electrode pressure essential for consistent high production of quality welds. The rocker arm is mounted on roller bearings to provide for long life under severe operating conditions, and hammering of the electrodes is said to be minimized by the light

**Curved Tooth Milling  
Cutters - Grip-All Saw  
Vise - Aber Cherrying  
Attachments.**

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WITH A  
**SERVICE**

*Punch!*

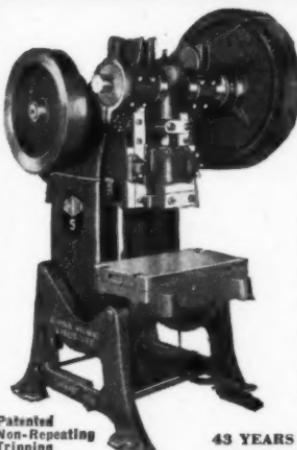
Allied's R-B  
Interchange-  
able Punches  
and Dies for  
the metal-  
working and  
plastics industries are *available from stock* in standard round, oblong and square shapes of almost any required size. Special shapes such as those illustrated are *promptly furnished* to your specifications in any size or material. Full information and comprehensive R-B Catalog on request.



**ALLIED PRODUCTS CORPORATION**

Department 21, 4644 Lawton Ave.

Detroit 8, Michigan



## UNLIMITED PEAK PRODUCTION

Much larger die space than average presses. Engineered and designed for unlimited peak production.

Reinforced construction at points of greatest wear.

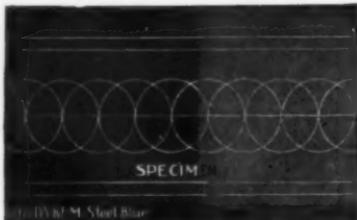
If you want the best, send for illustrated catalog describing complete line TODAY.



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Tripping  
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43 YEARS ENGINEERING EXPERIENCE BUILT INTO EVERY JOHNSON PRESS USED BY LEADING MFR'S. THROUGHOUT THE WORLD.

**JOHNSON MACHINE AND PRESS CORP.,** ELKHART,  
INDIANA



## DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

*Write for full information.*

### THE DYKEM COMPANY

2301C North 11th St., St. Louis, Mo.  
In Canada: 2466 Dundas St. West, Toronto, Ont.

weight welded steel construction of the rocker arm assembly. Minimum obstruction on the front of the welder and around the rocker arm assembly is a feature pointed out by the manufacturers.

Standard equipment includes foot switch control, air pressure regulator, universal horns, water-cooled electrode holders and one set each of straight and offset copper alloy welding points. Series A-200 Peer Welder capacities are 10 and 15 KVA with throat depths of 8", 12", 18", 24", and 30". For further details write Dept. BB, Pier Equipment Mfg. Co., Benton Harbor, Mich.

"I Want a Set of WALTON  
TAP EXTRACTORS

to get those d---d  
broken tops out," says  
the smart machinist.  
He knows a Walton  
will do the job faster,  
cleaner, easier and  
safer!

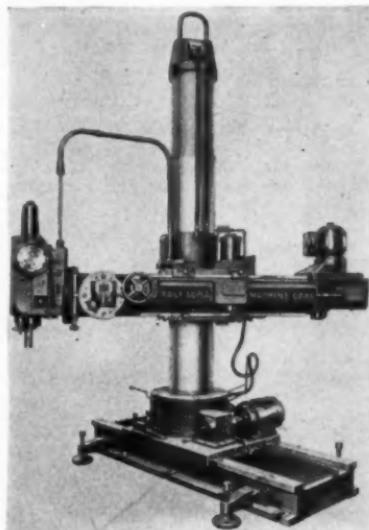
**Inexpensive**  
Write for Folder No. 12  
and offer of 30-Day  
Free Trial.

**THE WALTON CO.**  
94 Allyn St.  
HARTFORD 3, CONN.

### UNIVERSAL DRILLING AND TAPPING MACHINES

The combined operations of radial and horizontal drilling and tapping machines are claimed to be available in the Kaukauna series 125 Portable Universal Horizontal Drilling and Tapping Machines, designed and built by the Kaukauna Machine Corp., Kaukauna, Wis.

This machine is designed to eliminate multiple set-ups and hand drilling and



tapping operations. Portability, flexibility and operating range permits their being moved easily. An important feature is the head which swivels 360° in either a horizontal or vertical plane. Thus, it is possible to operate the spindle, which has a 12" continuous travel, in any conceivable angle.

As shown, work is held on a Kaukauna Model 700 Indexing Table which permits the work to be quickly rotated to present five surfaces to the machine. Three spindle feeds are provided, and the drive to the spindle consists of a 9-speed gear change box.

A total of 36° spindle movement radially from the center of the column is available. To facilitate handling machining operations on long workpieces, the column is supported on a traveling column base

which has a 48" power travel.

Dual controls provide access to all machine controls regardless of the head position. Electrical collector rings on the base of the column prevent cable interference no matter how many times the machine is revolved.

Kaukauna offers three models in the series 125 Portable Horizontal Drilling and Tapping Machines. The Model 125-U Universal Unit is a completely universal machine and will drill and tap holes at any conceivable angle. The No. 125-HR and 125-H Machines are horizontal machines. The HR Machine has the head mounted on two horizontal rails, having a 24" horizontal adjustment. Model 125-H has a smaller range of application and its compactness makes this unit adaptable to lowering into small vessels or for operation in cramped areas.

A bulletin, describing these outstanding Portable Horizontal Drilling and Tapping Machines, together with complete specifications, is available on request.

#### DIAMOND POWDER APPLICATOR

Size uniformity, cleanliness, and efficiency are outstanding characteristics claimed for Elgin - processed diamond powder.

Compared with other types the Elgin product shows definite superiority over federal standards, according to officials of Sapphire Products Division of Elgin,



where the diamond particles and a diamond compound are prepared.

Even surfaces assure that practically all particles will cut, resulting in a finish that is high and uniform without scratching or pitting, it is pointed out. In addition to the favorable particles size uniformity there is an absence of "non-working" fines in the Elgin-processed diamond. The compound is colored for positive particle size identification at all times.

A gun type applicator, illustrated, pro-

#### INSTRUMENT LATHES

For those "small lot" parts which are costly — or the more difficult second operations, the Gilman Instrument Lathe with production accessories, will permit savings on your small part production. High spindle speeds, self-indexing turret, double tool cross slide and rigidly designed throughout, make the Instrument Lathe meet with modern production requirements.

*Gilman*

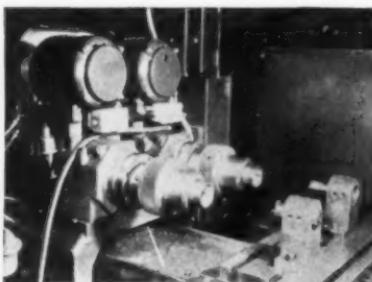
ENGINEERING & MANUFACTURING  
Corporation  
JANESVILLE, WISCONSIN

tects the diamond powder from contamination because it is fully enclosed and also meters the quantities of diamonds used.

For further information write to Dept. BB of the Sapphire Division, at Elgin, Ill.

### CHUCK OPERATED BY AIR CYLINDER

This bushing was to be bored on an Ex-cell-O Machine. The requirements



were 2.000 (.001", - .000") diameter on the front spindle, turn end for end and 1.875 (.0005, - .0005) on the rear spindle. It was reported that the use of hand-operated chucks led to variations in the pressure applied by different operators, resulting in out-of-round i.d.'s. Scrap ran up to 13%.

Erickson No. 701 air-operated face plate chucks were put on the job. It is stated that the desired finish was attained, and that concentricity between individual bores and outside diameter was held to within .0005" T. I. R. and concentricity between bores to .002" T. I. R. Production is said to have gone up 50% and scrap down to 1%.

The collet chuck, adaptable to air operation is made by Erickson Tools Division, Dept. BB, 2309 Hamilton Ave., Cleveland 14, Ohio.

### MIDGET FIXTURE CLAMPS

Of interest to designers and toolmakers is a new series of very small fixture clamps manufactured by the West Point Mfg. Co., of 19625 Merriman Court, Farmington, Mich. This series—called the Midget—consists of 4 styles of clamps (including quick action clamps) of very small size for the easier holding of small work pieces.

The clamp strap is only  $2\frac{1}{2}'' \times \frac{5}{8}'' \times \frac{3}{8}''$  in size, yet each clamp is made in exact proportion to the larger Wespo clamps—and have spherical washers with ground radii to compensate for irregularities in the work. Wespo Midget Clamps are made of steel, heat treated and cadmium plated. All clamps are available for immediate delivery. Write Dept. BB.

### GUIDE TO EYE SAFETY

A new eye safety guide which lists industrial eye hazards by industries and recommends the proper protection equipment is announced by American Optical Co. Free copies of the guide can be obtained by writing Dept. BB, of the company, at Southbridge, Mass.

Seventeen eye-hazardous operations in 17 industries are listed in the guide which also contains descriptions and pictures of the equipment that should be worn for complete eye protection. The guide is so arranged that the proper choice can be made in a few seconds.

Eye-hazardous jobs listed included acetylene burning and cutting, welding, furnace operation, babbitting, chipping, grinding, steam boiler operation, operating hand tools (manual and power driven), machine shop tools, etc.



### MUMMERT-DIXON FACING HEADS with Automatic Feed

One-way Tool Feed — 6, 9 and 12" sizes.

Two-way Tool Feed — 9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes.

Save many costly set-ups.

Bulletin No. 4141 Gives Full Details

MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.

## WELDERS' PROBLEM SOLVED BY SPEED-SHIFT GOGGLE

One of the problems encountered by welders is said to have been solved by the introduction of a speed-shift goggle mounted on a plastic headgear. Development of this goggle has been announced by the Chicago Eye Shield Company.

Welders must constantly shift goggles from their eyes to their forehead for layout and inspection. With the new Cresco Speed-Shift, a quick flip of one hand moves the goggles in and out of position. The welder simply pulls the goggles slightly forward, then releases them on the forehead. When inspection of work has been finished, the goggle is quickly returned to working position. There is no interference with personal glasses worn under the Speed-Shift goggle.

This is made possible by the application of a special devise. The goggle cups are attached to the headgear, and controlled by coil springs, mild enough to eliminate pressure, yet strong enough to hold the goggles firmly in place.

The goggle cups are adjustable to individual facial requirements. The headgear is made of flexible, form-fitting plastic. It can also be cleaned easily with a cloth.

Further information about the new Cresco Speed-Shift goggle can be obtained by writing the Chicago Eye Shield Co., Dept. BB, 2300 Warren Blvd., Chicago 12, Ill.

## SOLDER FOR ALUMINUM

All-State Welding Alloys Co., Inc., Dept. BB, 96 West Post Road, White Plains, N. Y., announces the immediate availability in unlimited quantities of a still lower-temperature rub-on solder for aluminum work. This addition to the All-State line of low-temperature welding and brazing alloys is an alloy that is applied without flux.

As used on aluminum castings, this alloy has good matching color and fair corrosion resistance. It is recommended for filling and soldering where tightness is essential but strength is unimportant; and also for the repair of blowholes; for building up worn surfaces on aluminum castings; as well as for salvaging and making changes on foundry patterns. It is also excellent for repairing cracks in aluminum cylinder heads and for filling in surface defects where high temperatures must be avoided. This alloy is known as All-State No. 39 aluminum solder rod.

**IF** your production entails drilling . . . milling . . . reaming . . . tapping or slotting operations . . . the amazingly speedy



**UNIVERSAL JIG VISE**  
OFFERS ALL ENGINEERS



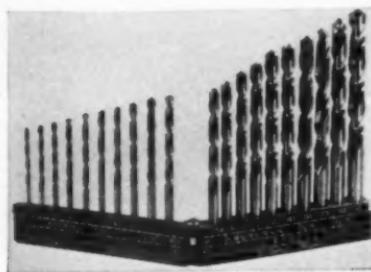
Time and Money-Saving Tooling and Production Short-cuts. Saves you tooling time and money . . . gets you to the point of production with amazing speed . . . pulls down your day in and day out . . . production costs.

Descriptive literature on request.

**J. M. SHORT & ASSOCIATES**  
53 West Jackson Chicago 4, Ill.

### COMPACT DRILL STAND

Something entirely new in drill stands, the "Geneva", has been developed to fill



the need of the average machinist for a handy compact stand which holds the drills he uses most. The Geneva Drill Stand holds 20 of the most commonly used tap and body drills—fractional, letter, and number—from .106 thru .437 (6-32 thru 7/16 x 20). The easily read designations under each drill show decimal, tap and drill sizes. This feature is provided to save wasted time referring to drill

### Die Filer and Saw

A versatile tool for every tool room or machine shop



Bench Model \$67.50  
F. O. B. St. Paul

File is fixed in its up and down stroke, assuring precision filing. A adjustable table, can be locked for precision angles. Overall arm removable for small internal filing. Use as jig saw . . . sawing plugs for die punches . . . general contour work.

**MASTER PRODUCTS INDUSTRIES**  
79 W. Summit Ave., St. Paul 2, Minn.

tables. Much production time loss is also saved by the elimination of lost drills and trips to and from the tool crib.

The Geneva Drill Stand folds compactly with the drills in place. It fits handily into one of the small drawers of a machinist's tool kit. Another outstanding feature is noted when the drill stand is closed; the drills are held firmly in place and will not fall out, even tho the stand is held upside-down.

Made of light-weight anodized aluminum alloy and lettered with durable baked enamel, the Geneva Drill Stand makes an attractive, practical addition to the tool kit of every machinist, professional or amateur. National distributor is the Glenn C. Hall Co., Dept. BB, 541 S. Spring St., Los Angeles 13, Cal., who is now appointing jobbers thruout the country.

### DISC SANDER & POLISHING HEAD

The Lake Disc Sander and Polishing Head Combination is made for heavy-duty work and is adaptable to a number of industrial uses. The hooded frame is made of cast aluminum, the arbor and

### FULGRIP HOLDERS

Single or double end—assorted colors—name in gold. Use as Drafting Pencil, Pin Vise, Scriber Point Holder, Small Tool Holder—Drills, Engravers, Files, etc. Carbide scriber points available, 50c each.

### 10 Days Free Trial

New type collet grips firmly entire length of collet. Holds parallel or tapered parts. Mention of this ad entitles you to 20% discount on single orders, 35%, 12 or more if you send money or C.O.D.

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	RETAIL	20% OFF
Single End	\$1.25	\$1.00
Double End	1.75	1.40
Carbide Point	.60	.50
Name in Gold	.10	.08
Extra Collets	.15	.12

**FULGRIP COLLET AND TOOL COMPANY**  
21200 W. 8 Mile Road Detroit 19, Mich.

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WONDER  
CUTTER

The lowest-priced wire and rod cutter on the market. The hardened cutters last indefinitely.

Hand operated. A giant for work, cuts wire and rods up to  $\frac{1}{8}$ -in. round or  $\frac{3}{16}$ -in. square and band iron up to  $\frac{1}{2}$  in. by 2-in. Adjustable stop for repeated cuts to same length. Large or small, your shop can use a WONDER CUTTER.



*Write today for prices.*

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CARROLL  
AND  
JAMIESON  
LATHES  
15" AND 16"

12 Speed Geared  
Head Motor Drive  
Timken Mounted  
Spindle.

Modern Design—  
Liberal  
Dimensions.



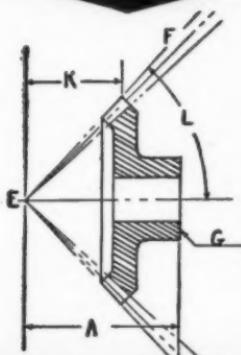
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for  
Bulletin.

CARROLL & JAMIESON  
MACHINE TOOL CO.

Here's the  
Problem

... and here's the Answer  
EASY BEVEL GEAR GAUGING

No Long Calculations  
No Involved Set-up



With Herkimer sine bars and bevel-gear gauges, anyone with ordinary gauging experience and ability to read blueprints can quickly and accurately check all important bevel gear dimensions and relations. Production gauging made easy.

Write for Free Copy  
of Bulletin 100



HERKIMER TOOL & MODEL WORKS, 108 King St., Herkimer, N.Y.

## Square, Straight Tapping in HALF THE TIME

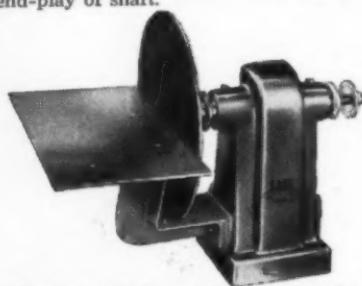


The Dahlstrom Tap Guide practically eliminates tap breakage, and turns out uniform work. Just fasten it to a post or bench, slip a Tap Adapter into the spindle, and turn the handle. Equipped with Adapter from 8-32 to  $1\frac{1}{2}$ " (Taps not furnished). Literature on request. Dahlstrom Mfg. Co., 416 South Sixth St., Minneapolis 15, Minn.

### Dahlstrom TAP GUIDE

flanged spindle collars of precision machined steel.

Drive can be applied from below or behind with a  $1\frac{1}{2}$ " v-belt. Two individual v-pulleys on the arbor allow a wide speed range and permit adjustment to eliminate end-play of shaft.



The head drives a wide variety of accessories, is bossed on both sides to take brackets and tables. Attachments are available for buffing, wire brushing, grinding, drilling, etc.

The Lake Disc Sander and Polishing Head is made by the Lake Manufacturing and Engineering Co., 505 Industrial Bldg., Syracuse 4, N. Y.

## FLASH WELDING EQUIPMENT

A complete new line of flash-welding equipment has been announced by Sciaky Bros., Dept. BB, 4915 W. 67th St., Chicago. Welders range in size from 75-KVA for .90 sq. in. mild steel up to large, completely automatic machines rated 500-KVA for capacities up to 5 sq. in. Included are mitre joint welders for improved production of steel and aluminum window frames, door sash etc., for the building trades. Flashing and upsetting on smaller welders is by means of a hand lever. Large welders may be either all power-operated, or a combination of hand lever flashing and power upsetting.

Several advanced design features are reported to be incorporated in the line. Frames are designed as a self-contained beam with conductors from transformer to dies outside the frame, to eliminate need for a weakening cutout within the frame and allow transformer to be protected from flash sparks.

Platens move on a wide, rigid T-shaped bed with a narrow guiding key. Accurate guiding is assured with stresses distributed over large flat bearing surfaces.

Clamps are actuated by a high-pressure, booster-supplied hydraulic system, to allow use of small diameter cylinders so that the direction of force can be directly over the clamps.

On the large power-operated machines, flashing and upsetting is independently controlled. Both platens are moved by an air cylinder driving a wedge-shaped cam between rollers. These can be controlled so that it is seldom necessary to change cams.

When welding tubes over 3" O. D. a dual transformer supplies heat to both upper and lower dies, assuring perfect distribution of heat.

Heavy duty machines can be equipped with synchronous timing control, post-heat current and phase shift heat control to permit welding of aluminum alloys, high carbon and aircraft steels.

## TURN-TABLE WASHER FOR SMALL AND MEDIUM SIZED PARTS

The Mabor Company has produced a Turn-Table type washer, which both rinses and dries average sized parts in baskets, trays, or individually.

This unit requires only one operator to load and unload the parts for cleaning. The washer is completely self-contained and requires little floor space. The manufacturers report a substantial produc-

**Real Cleaning Power  
One - Man Portability  
with TORNADO**



**Portable Industrial  
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QUICKLY picks up chips, dust or water. Cleans walls, beams, machines, floors, boiler tubes and tops, molds, etc. Powerful - portable. A real one-man unit. Weighs only 40 lbs. Dirt capacity 12 gals.

Write for details and  
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Electric Mfg. Co.

5118 N. Ravenswood Ave., Chicago 40, Ill.



EDWARD BREUER'S BALL BEARING  
**TORNADO**  
PORTABLE INDUSTRIAL VACUUM CLEANER

**SEE BETTER**  
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The Best Eye Aid  
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- LATHE WORK
- BENCH WORK
- SAW FILING
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Pat. U.S.A.

EVERYONE in your plant who does precision work can do it easier, faster and better by wearing a Magni-Focuser. This binocular eye-loop enables you to see an object sharply magnified with the comfort and clarity of normal vision. Relieves eye-strain—lessens fatigue—reduces accidents. Allows free use of both hands. Available in different magnifications, from  $2\frac{1}{4}$  at \$8.50 to  $3\frac{1}{2}$  at \$10.50. If your distributor cannot supply you, order direct. Money refunded if Magni-Focuser does not help you see better.

**EDROY PRODUCTS CO.**  
478 Lexington Ave., New York 17, N. Y.

**PROMPT DELIVERY ON  
THIS EFFICIENT SQUARING SHEAR**

A newly designed Foot Power Squaring Shear embodying many new improvements not found on similar machines. Built in one size, 36" to shear 16 gauge soft steel and lighter.

All steel welded construction, unbreakable. All parts of ample size, strongly braced to cut up to full capacity without springing.

Adjustable front and rear gauges are provided. Machine is also furnished with spring articulated hold-down.

Manufactured by  
Economy Tool & Gauge Company



EXCLUSIVE DISTRIBUTOR

**ACME EQUIPMENT COMPANY, INC.**

128 S. Clinton St. ANDover 3430 Chicago 6, Ill.



# DOWEL PINS



## Immediate Delivery!

Standard Size Dowel Pins from  $\frac{1}{8}$ " to 1" diameter and from  $\frac{3}{8}$ " to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 oversize will be furnished.

## SCHULTZ & ANDERSON CO.

109 Edison Place, Newark 5, N.J.

## BURR KEYSEATERS



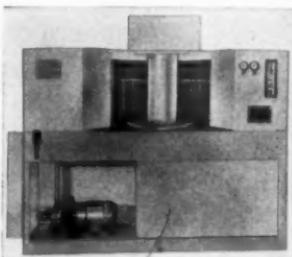
Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

**JOHN T. BURR & SON**  
429 Kent Ave., Brooklyn, N.Y.

tion of an average of sixty baskets per hour. Basket dimensions—12" x 12", 16" x 16", or 20" x 20", with load capacity of 1800, 2500, or 3000 pounds, according to size of machine. This washer is available



in three standard sizes and may also be had with special modifications for difficult and unusual problems, where centering of parts is essential. It may be heated by steam, gas, oil or electricity.

For additional information, costs, engineering data, etc., write Dept. BB, Mabor Co., Clark Township, Rahway, N.J.

## KNURL it Easily, Quickly, Safely

Use any Standard Knurl  $\frac{7}{16}$ " x  $\frac{3}{4}$ "



Two Sizes:  
1 $\frac{1}{16}$ " to 2"  
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FOR LARGE OR SMALL LATHES



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CHAMPION BLUE DEVIL—50% OFF LIST

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**GENERAL MANUFACTURERS SUPPLY CO.**  
108 S. CHARTER HEmlock 5004 **DAYTON, OHIO**

### 30 AMPERE RECEPTACLES, PLUGS AND CORD CONNECTORS

A new line of Ever-Lok Receptacles, Plugs and Cord Connectors for 30 amperes, 440 volts, a-c., increased capacity for



high cycle operation—is announced by Russell & Stoll Co., Inc., 125-33 Barclay St., New York 7, N. Y.

These units are not interchangeable with other 10 and 20 ampere Ever-Lok equipment.

Typical uses are for heavy duty industrial purposes, and many other applications such as for the connection of power-driven tools and portable equipment, etc.

Among the features of this new unit are: Receptacle has fully protective hinged cover and gasket, strong spring keeps door closed and dust-tight, solderless terminals with metal shield for protecting terminals, compact design, yet large capacity. Plug contacts are precision-ma-

ched, self-wiping, and self-aligning, and positive grounding.

A new 4-page bulletin describes and illustrates this new unit, shows inner-structure with salient features, contains dimensional drawings, lists ordering information, prices, and other pertinent data.

### ELECTRIC AND FOOT LIFT TRUCK

Featuring alternate types of lift—electric and foot—the 1947 models of the Transporter motorized hand truck of the Automatic Transportation Co., 149 W. 87th St., Chicago 20, were announced.

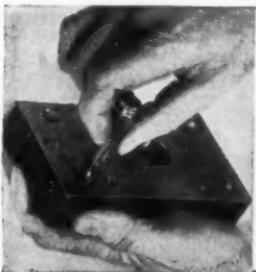
The 1947 Transporter with ATCO Electric Lift is a new addition to their line. They report that it can operate with a standard 11-plate battery. According to this announcement it is possible to maintain interchangeability of batteries and battery chargers thruout Automatic's line of motorized hand truck units.

Thus, the same batteries and chargers—including those already in service—may be used with the two 1947 model Transporters, the push-pull unit and the high-lift stacking unit. All controls are arranged to be regulated by one hand and operated virtually simultaneously.

Feature of both the new electric lift and foot lift Transporters is a new double-position brake, which is applied either by raising or lowering the guide handle, providing steering and braking leverage simultaneously for operations on ramps.

Both the electric and foot lift Transporters will be made in Automatic's three standard units—4000 and 6000 pound load capacity platform models and 4000 pound capacity pallet model.

Write to Dept. BB of the manufacturer for more descriptive and complete details.



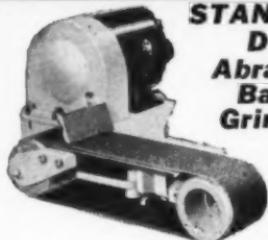
### A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in  $\frac{1}{16}$ " to 1" diameters. Send for price list.

**HEIMANN MFG. CO.**  
332 Lincoln Ave.  
Urbana, Ohio



**STANDARD**  
**D-4**  
**Abrasive**  
**Band**  
**Grinder**

Famous  
for  
Stamina

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4x36 $\frac{1}{4}$  band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW  
MANUAL ON FINISHING—WRITE TODAY

**WALLS SALES CORP.**  
306 E. 38th St., New York 16, N. Y.

**COOLANT  
PUMP**

At last, a dependable, low price coolant pump for machine tools. Constructed of non-corrosive materials. Plastic screen quickly removed for cleaning. Fully guaranteed by old, reliable manufacturer.

With this pump and small pan for fluid you obtain the same results as with expensive equipment.

May also be used for Evaporative Coolers, Fountains, Displays, etc.

Write for Folder

LIST PRICE—POSTPAID

**\$19.50**

JOBBER AND DEALER  
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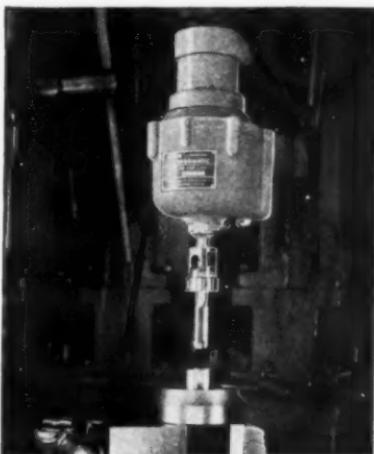
**AMERICAN  
METAL PRODUCTS CO.**

FORT WORTH 9

TEXAS

**JARVIS ANNOUNCES TORQOMATIC**

The Charles L. Jarvis Company, manufacturers of power tools has announced the availability of the Torqomatic—a



universally adaptable torque-driven tapping attachment. Available in three sizes, the sensitive Torqomatics will tap from soap to copper or chrome nickel steel without an appreciable increase of the finger-tip pressure required to operate an ordinary drill press.

These machines come in standard and built-in models and can be furnished to fit any drill press or tapping machine. Precision built by Jarvis craftsmen from the finest materials, they are available at what the manufacturers describe as extremely low prices.

For more detailed information, write for a copy of the eight page fully illustrated Torqomatic folder. Write The Charles L. Jarvis Co., Dept. BB, Middletown, Conn.

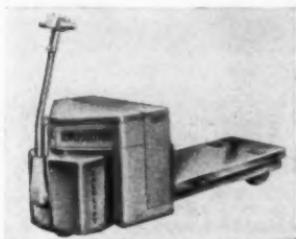
**POWER JACKLIFT**

Vertical Handle operation and the Electric Brake are featured in this new Power Jacklift, built in both Platform and Pallet Models.

Every operation can be performed with the handle vertical. Even in close quarters, the operator can maneuver easily and

stop safely. Let go the handle and the smooth-action electric brake will instantaneously stop the truck. In the vertical position or when lowered, the handle has

perfected Power Jacklift may be obtained by writing to Lewis-Shepard Products Inc., Dept. BB, 248 Walnut St., Watertown, 72, Mass.



a steering arc of 200°. Thus accurate loading, lifting, travel, lowering and spotting of loads are assured at all times.

Both models are driven by an Electric Master Drive Unit. Gear drive and all wheels are mounted on ball bearings, totally enclosed and packed in grease. Trucks are available in several lengths. Platform Truck in both wide and narrow models. Literature covering all mechanical and operating features of this recently

#### INDEX TABLE

The Robbins Engineering Company announces the new Robbins Index Table for fast, accurate indexing on a wide variety of production operations.

The table is indexed manually—located automatically. To index, the crank handle is turned to horizontal which disengages a large diameter locking pin; as the table is indexed the handle is released and the table is locked in the next position automatically.

It is stated that this index table is fully supported by a large specially designed ball bearing which eliminates out-of-parallel conditions due to vertical thrust from cutting tools or heavy parts located off-center on the table. Special design of the support bearing also prevents brinelling of the races. An anti-friction radial mounting is designed to produce effortless indexing and reduce operator fatigue.

All wearing parts are hardened and ground for maximum life and are con-

PATENT  
No. 2405503

Concentricity In  
Lew 10,000 lbs

Curtiss-Wright Corporation ranks our product with their best tools. Cleveland Graphite Bronze Company, leading bearing manufacturer, states new high accuracy reached, plus substantial production boosts.

ROUGHLY SKETCH DESIRED MANDREL INTO YOUR PART PRINT AND FORWARD FOR QUOTES.

YOUNG ARBOR CO. • PH. YE-9784  
8257 Bradford Rd., Cleveland Hts. 18, Ohio

WHITNEY-JENSEN PRODUCTS  
30 YEARS EXPERIENCE

Nos. 7-7½-8



#### ROLLER BEARING PUNCHES

##### CAPACITIES

3/4" THRU 1/8"-3/16"-1/4"

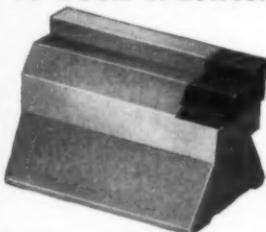
##### PUNCHES & DIES

3/32" THRU 1/2" by 1/16"  
VARIATION

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**•DOVE TAIL  
FORM TOOLS  
CARBIDE TIPPED  
TO YOUR SPECIFICATIONS**



**WRITE  
FOR  
FOLDER**

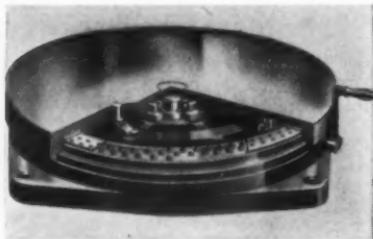
We manufacture tools to meet your most exacting requirements. Personal attention — lowest prices.

*Send us your prints for quotations.*

**CARBIDE TOOL COMPANY  
956 HARPER, DETROIT 11, MICH.**

sealed from dirt, chips, abrasives, etc. The index table and base are ribbed for extra strength.

Complete details are contained in a



fully descriptive bulletin available by writing the Robbins Engineering Co., Dept. BB, 318 Midland Ave., Detroit 3, Michigan.

**PRESS TYPE SPOT WELDERS**

A new line of press type welders featuring a "True Pressure" principle, claimed to be "the first really different design in the history of small spot welders" has been announced by the Taylor-

Hall Welding Corp., subsidiary of the Federal Machine and Welder Company, Warren, Ohio.

Features claimed for the new welder are:

1—The new welder which applies welding pressure in a straight vertical movement of the upper electrode, represents a departure from the "radial" pressure approach of the rocker arm type.

2—The vertical ram on which the upper horn is mounted rides V-shaped slides—20 inches long—designed for accurate alignment of electrodes and true pressure on every weld. The lower horn has a vertical adjustment of 6" and swing adjustment through 90 degrees. The upper horn may be adjusted 1" out beyond the end of the lower horn.

3—Occupying less than half the floor space required by the conventional spot welder—9" x 20" on the base—its narrow frame permits greater variety of angular work, less need for extra long horns. The back and sides of the machine are completely flush, valves and switches being recessed in the side panel.

The machine also offers an entirely new transformer design requiring less input for maximum welding power. Ratings now available are in 5 and 10 KVA capacities.

Write Dept. BB for further information.

**SKF STARTS MACHINING 5,100-POUND BEARINGS**

Machining what is said to be the largest spherical roller bearings ever built in the United States—two steel giants that will weigh more than two and a half tons each when fully assembled—is now under way at SKF Industries, Inc.

Four feet in diameter, and 1,500,000 times heavier than the smallest bearing produced by the company, they will be installed on the world's biggest super-calender now under construction at the Beloit Iron Works, Beloit, Wis., for the Niagara, Wis., paper mill of Kimberly-Clark Corp.

Excess metal will be removed from the forgings by carbide cutting tools before the rings are hardened by heat treating, sand-blasted, and sent to grinding machines.

Each of the bearings, designed for a basic load-carrying capacity in excess of 4,000,000 pounds, will be used to support the bottom rolls of the 10-roll calender, a machine that imparts a high-quality finish to paper as it passes between a series of rolls under tremendous pressure.

## ILLUMINATED INSPECTION BORESCOPES



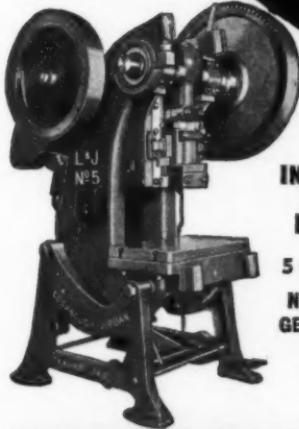
"Lenox Detects Hidden Defects" while exploring the dark holes of industry—guns, hollow shafts—Refinery, well drill and other tubing, irregular dark spaces.

American Pioneers—Twenty-three years. Give diameter, length and shape of cavity.

LENOX INSTRUMENT COMPANY

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PHILADELPHIA 3, PA.

Standard Since 1911



INCLINABLE  
POWER  
PRESSES

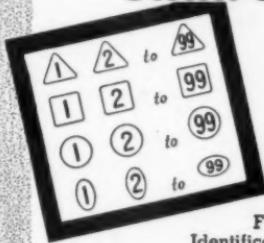
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NO. 5 BACK  
GEARED TYPE

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New STEEL  
INSPECTOR'S  
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Faster  
Identification  
of Inspectors or Operators.  
Different borders may be used  
for different shifts. Available  
in 4 sizes. Write for prices  
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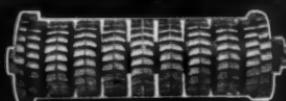
NEW METHOD STEEL STAMPS, Inc.  
147 JOS. CAMPAN  
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Send your cutting tools in today for Sharpening, Salvaging, Reconditioning

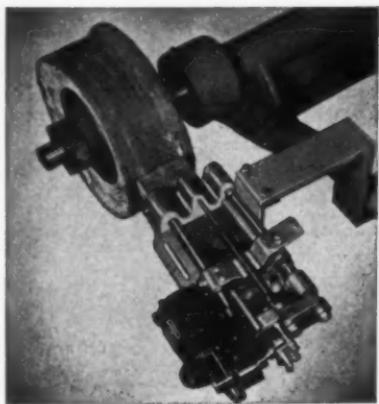
**SAVE UP TO 70%**

Rutland  
13006 GREELEY



TOOL SERVICE  
DETROIT 3, MICH.

## AUTOMATIC APPLICATOR



A new buffering compound applicator that has an intermittent feed control operating at the rate of 14 strokes per minute, affording a feed ranging from .0015" to .015" per stroke is announced by

the George L. Nankervis Co., Dept. BB, 5442 Second Blvd., Detroit 2, Mich. The manufacturer asserts that the Nankervis Applicator can be mounted on any automatic machine, (either right or left-hand) and can be adapted to everything from the simple to complex multiple-stage buffing operations. It is driven by a totally enclosed geared head motor—110 volt, 220 or 440 volt motors are available.

Total weight is twenty pounds. It is maintained that this automatic method of applying the compound as compared to feeding by hand will effect high savings, saving in compound, improvement in the quality and uniformity of the work, and speeding up of the job.

## 3-WAY TAPPING MACHINE

This is the LeMaire 3-way tapping machine for Cylinder Block bottom and both ends.

This machine consists of a rigidly fabricated one piece base on which Standard LeMaire No. 150 lead screw tapping units with multiple spindle heads are mounted at each end and a No. 200 tapping unit on a Standard Column is mounted at the rear.

A bridge type fixture is provided which

**MULTI-DRILL**  
ADJUSTABLE

**6 or 8 SPINDLES**  
DRILL UP TO 6 or 8 HOLES AT ONE STROKE in ANY PATTERN  
WITH MULTI-DRILL  
FITS ANY DRILL PRESS

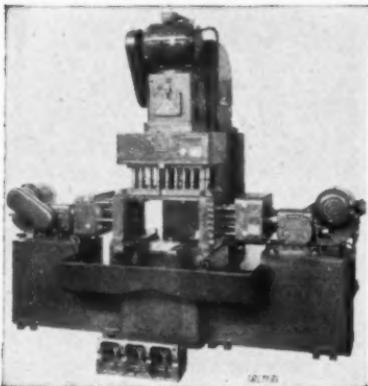
The new 8-Spindle unit in the MULTI-DRILL line brings your single spindle tools even greater production capacity and wider operating range. Now you can drill up to 8 holes at one stroke in ANY hole pattern on or within 9" circles— $\frac{1}{2}$ " center distance, using drill sizes  $1/32$ " to  $\frac{1}{2}$ "! All the features which made MULTI-DRILLS preferred tools are built in . . . fast, easy positioning of locating arms . . . heavy duty, long-life universal joints . . . "oilite" life-time bearings . . . precision collet spindle assemblies and rugged construction which assures long, trouble-free service. The 6-Spindle MULTI-DRILL handles any hole pattern on or within 5" circles— $\frac{1}{2}$ " min. centers.

Write for Catalog Sheets and Complete Details

**ADJUSTABLE TO ANY DESIGN**

**COMMANDER MFG. CO.**  
4227 W. Kinzie Street  
Chicago 24, Ill.  
Tel. SACramento 4545

incorporates an air cylinder actuated toggle type elevating mechanism that jacks part up against pan face, incidentally



when elevated part assumes final location by engaging pins with the locating holes. Wear strips, guide rails and adjustable stops are used with manual loading for

preliminary location.

Operations claimed are:

1—Tap 12 holes—right end (rear of block)

2—Tap 30 holes—top (pan face of block)

3—Tap 6 holes—left end (front of block)

Approximately 90 pieces per hour at 100% efficiency allowing 30 seconds to load and unload are claimed.

For further details write to LeMaire Tool & Mfg. Co., Dept. BB, Dearborn, Michigan.

#### DISINTEGRATING BROKEN PARTS

The Elox Corporation, 602 N. Rochester Road, Clawson, Mich., are offering a new folder describing their method of Electrical Disintegration for removal of broken reamers, taps, drills, studs, etc., and its new application for die-cutting without milling, drilling or chipping.

Several types, including three new models are illustrated and described. Also included is description of a new die making technique by using the principle of disintegration. Write to Dept. BB of the Elox Corp. for a copy.

## MULTIPLE POINT AIR OPERATED WELDER

This machine is built with multiple points to suit the multiple spot welded job desired. Welding heads are adjustable and adaptable for many new applications. We will engineer to your prints. This particular setup is a standard gun welder mounted on movable angle holders and enables a wide variety of square or rectangular jobs to be handled particularly for cabinet door edges. A door edge can be spotwelded at six points or more, if desired. Upper and lower fixtures in various sizes complete a flexible spotwelding setup, which can be readily lined up on a heavy mounting table. We also handle a complete line of welding equipment from a 3 KVA to 1000 KVA.

PRICES QUOTED ON REQUEST

**Specialty Equipment & Machinery Corp.**

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### ABRASIVE CENT-R-LAP TOOL

Saves time, eliminates diamond dressing. Cones changed in seconds. Available in 2 sizes  $\frac{3}{8}$ " and  $\frac{5}{8}$ " Cent-R-Laps and abrasive Cones.

Write for descriptive literature and prices.

**J. R. Reich Manufacturing Co.**  
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### GAGES 50% OFF

All sizes thread plugs, thread rings, pipe plugs and rings, roll thread snaps—our \$100,000 stock of new VARD gages to be sold now. Many specials included at price of standards. Send us your orders today. We guarantee.

**PAUL B. SLATER CO.**  
2335 E. 8th St. Los Angeles 21

### SMALL, KNEE TYPE MILLER

Model No. 0000 Knee Type Milling Machine manufactured by Childs & Co., is asserted to fill an important need for a small, low-cost, accurate and sturdy miller designed for manufacturers of small parts, for tool and die shops, instrument makers and laboratories, experimental shops, watchmakers, gunsmiths, fountainpen and mechanical pencil manufacturers, fabricators of electrical and electronic devices, and individual home craft shops devoted to model-making and metalworking.

The capacity of the unit is indicated by the following feeds: longitudinal 6", transverse  $1\frac{1}{2}$ ", and vertical 4". Movement of the table in transverse, longitudinal and vertical directions is held to ".001" in accuracy and ".0001" tolerance applies to run out of the spindle.

The  $1\frac{1}{2}$ " high basic unit may be used for bench or table model operation or when used with the pedestal base—offered as an accessory—provides a floor-type milling machine. In either instance the double Vee Belt drive comes up thru the column.

A countershaft and jackshaft with V-belt pulleys provide nine changes of

speed. The countershaft assembly, which is available in the pedestal base, provides speeds from 280 rpm to 11,150 rpm.

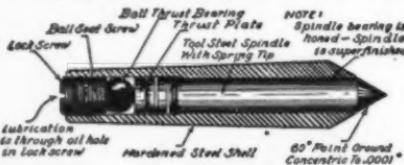
A  $\frac{1}{2}$  hp motor is generally recommended, but if only lighter cuts are to be made, a  $1/3$  or even  $1/4$  hp fractional motor may be used. The  $1\frac{1}{2}$ " high basic bench unit weighs 75 lbs. Descriptive literature and complete details may be obtained by writing the manufacturer, Childs & Co., 202 16th St., Conneaut, Ohio.

### ECONOMICAL WELDING

How to save money by using low temperature welding is the subject of a 32-page booklet now available from All-State Welding Alloys Co., Inc., Dept. BB, 96 West Post Rd., White Plains, N. Y. This booklet tells of savings resulting from the use of low-temperature welding, and serves as a catalog and instruction guide for all of the products of the All-State line.

These products include rods especially designed for work on cast iron, steel, stainless steel, copper and other metals; a galvanizing powder for cast iron, a powdered brazing compound, and fluxes.

### •••REVOLVING TIP LATHE CENTER•••



**ERNEST H. VANDERWALL CO.**  
440 Golden Gate Ave. San Francisco 2, California

- Runs cool and yields under load to compensate for work expansion
- Same dimensions as standard solid centers
- No more messy lubrication of work centers
- No more damaged center holes in work
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- Saves time—saves money—saves work

**\$6.25**

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Taper Shank

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FOR  
DETAILS



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and are available in Noiseless Spinning and Vibrating Hammer types. Also Vertical and Horizontal Multiple Spindle Spinning Machines. Write for literature and don't forget to send samples.

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C E Station, Bridgeport 5, Conn.

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**TOOL CRIBS and PARTITIONS**

Standard Sections Woven Wire Mesh Panels and Doors to enclose Tool Cribs, Stock rooms and other enclosures.

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3519 E. CANFIELD — DETROIT 7, MICH.

## STAINLESS STEEL FLUX

The manufacturers of No. 6 Stainless Steel Flux report that it will work almost instantaneously on light gauge metal and has the advantage of depositing very little flux residue.

This Flux is said to have the further advantage of giving off less fumes and odors to facilitate its use by an operator working in a confined space.

No. 6 Stainless Steel also contains a wetting action to permit the flux to penetrate

oil, grease and other extraneous coatings commonly found on this metal.

A special compounding is incorporated in the manufacture to provide flux at a low temperature. Thus, when soldering light gauge stainless steel, buckling is claimed to be eliminated.



## Save— SPACE AND LIFTING

Yohé Racks take less floor space—hold more stock and require less lifting. Four arm rack, 51" high stacks, 10,000 lbs. Five arm rack 57" high holds 12,000 lbs. flat or round stock—at safe lifting heights. Use against wall or back-to-back in center of room.

Let us send details and prices.



WM. S. YOHE SUPPLY CO.

503 Mahoning Rd., N.E. Canton, Ohio

For more information on prices and other related products of this company write to Farrelloy Co., 1241 North 26th St., Philadelphia 21, Pa.



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FORMING • EMBOSsing  
RIVETING • HEAT-SEALING  
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### AIR-HYDRAULIC PRESS

Sizes: 2½ and 6 Ton Capacities  
DOES MORE JOBS — Countless operations in metals, plastics, ceramics, leathers, etc. Delivers delicate pressures for the lightest jobs, or up to 2½ or 6 tons.

### SIMPLE OPERATION

—Quick action hand or foot operation—no physical effort, no noise, no impact shock.

**CONTROLLED AIR PRESSURE** — Adjustable, predetermined pressure through entire length of stroke.

**SIMPLE CONSTRUCTION** — No intricate assemblies to get out of order, fewer parts liable to wear.

Write for Catalog



**AIR-HYDRAULICS, INC.**

Factory: CHELSEA, MICHIGAN

Sales Office: 401D Broadway, N. Y. 13



### TOOL HOLDER

Holes only 15/16ths center to center can be tapped with a new Neoprene-mounted, positive drive, Tool-Flex tool holder according to the Burg Tool Mfg. Co., Dept. BB, 5028 W. Jefferson Blvd., Los Angeles 16, California.



This new product has Acme-threaded shanks for use on multiple-spindle tapping operations. Only four parts make up the product; shank, collet, oil-resistant Neoprene mounting, and locking ring.

Neoprene mounting is used to minimize tap breakage and compensates for misalignment. Bell-mouthing and over-sized holes are said to be eliminated by the full-floating mounting. All metal parts are precision ground of heat treated, alloy steel.

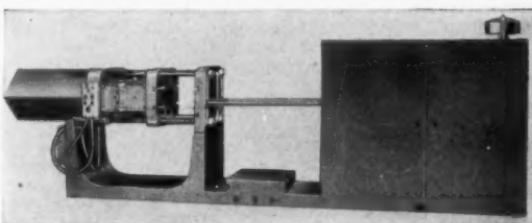
## ADDITION TO LINE OF DIE CASTING MACHINES

The H. L. Harvill Mfg. Co. recently moved into a new plant at Corona, Cal., and has announced a new addition to its line of die casting machines. The new model, designated HD103, is a high speed cold chamber injection type with center gate for casting aluminum, magnesium and brass alloys. Provision is made for conversion to hot chamber operation for casting zinc, lead and tin base alloys. These latter alloys may also be cast as cold chamber die castings, wherein the metal is hand ladled to the shooting cylinder, if so desired.

The machine is basically a small, light weight cold chamber type capable of casting up to 2.6 lbs of aluminum, or a proportionate volume of other base metal alloys, at a maximum reduction rate of 500 "shots," or casting cycles, per hour.

Engineering specifications provide for normal die dimensions of 13½" vertical by 23" horizontal with a dimension of 10" between dies in the open position and a maximum thickness of the dies when closed of 19".

The "shooting" or injection piston has a diameter of 4" with a stroke of 13". Operating under 1000 psi oil hydraulic



pressure a pressure of 5000 psi is applied on the molten metal injected into the die cavity. This company reports that research on the question of most effective metal pressure has indicated, and actual production experience with the machine has proven, this metal pressure to be ideal for high speed casting since sufficient pressure is exerted to produce sound castings with high mechanical properties yet free of problems of galling upon ejection, generally caused by excessive casting pressure forcing metal into any slight surface irregularity of the die cavity. The overall dimensions are: 2' 8" in width by 12' in length by 4' 6" in height.

Complete engineering and production information may be obtained when requested on company letterhead by writing to the H. L. Harvill Mfg. Co., Dept. BB, Corona, California.

### SURFACE EXAMINATION

Applications of Faxfilm in the study of surface condition are described in a new single page bulletin, Faxfilm Fax, published by The Faxfilm Company. As this method of surface examination is being used by inspection, production, research, engineering and sales personnel of almost

every type of industry, the company believes this bulletin is of wide general interest.

Persons wishing to receive future issues should send their requests on company letterheads to The Faxfilm Co., Room 543, 1220 W. Sixth St., Cleveland 13, Ohio.

"14¢ A YEAR FOR MAINTENANCE"

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# ARBOR PRESS

One user of 1659 Famco Arbor Presses has spent for maintenance an average of only 14¢ per press over a period of 10 years. These presses, in sizes to 15 tons pressure, require small investment, speed up work, are easily portable and save power and floor space. Send for full details.

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ARBOR PRESSES • FOOT PRESSES • SQUARING SHEARS



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### LEVER-TYPE DRAWBAR

The new improved Precision Lever-Type Drawbar illustrated, designed for production use on such half-inch collet



capacity lathes as the Atlas, Logan and South Bend is said to be particularly desirable for its ease of operation, and where there is a slight variation in work diameter. Developed by General Die and Stamping Co., Dept. BB, 262 Mott St., New York, it is provided with three positions of tension adjustment. Positive gripping tension is applied over the range of three adjustments, automatically adapting itself to the diameter of stock whether it be undersize, oversize or standard, and without the necessity of taking the unit apart.

### LINCOLN ELECTRIC ANNOUNCES NEW AC WELDER

The Lincoln Electric Company, Dept. 503, Cleveland, Ohio announces the new "Fleet-Arc" AC welder which is said to have many features not possessed by conventional a-c welding units.

The new "Fleet-Arc" AC welder is equipped with the "Arc Booster". The "Arc Booster" augments the current the instant the arc is struck. The arc is started automatically the moment the electrode touches the work. This added feature of the new welder has been accomplished safely without the use of special high frequency devices or higher voltage.

A selector switch on the front of the welder governs the amount of booster current to be used in striking the arc. This provides a complete range of strik-

ing intensity to suit requirements in the welding of thin sheets or heavy plates, making of tack welds, or in the use of various types and sizes of electrodes.

Current control, continuous and self-adjusting, is provided by the rotating reactor control, which affords fast setting throughout the wide range of the welder. The operation of current control is fast and involves the simple act of turning a hand wheel which requires a minimum number of turns to cover the range. The amperage is indicated on a calibrated dial on the face of the welder, placed in a weatherproof and readily visible position on the face of the unit.

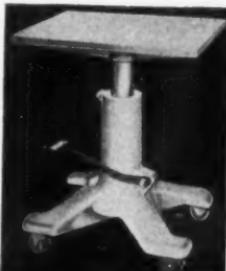
The reactor current control, held in position by cone brakes and actuated by a self-cleaning chain drive, is said to be smooth running.



Separate power transformer and adjustable reactor control are reported to enable the "Fleet-Arc" AC to duplicate the wide range of output of d-c welders, and at the same time simplify the low current welding of thin sheets and increase the welding of heavy plates at high current value.

A higher power factor and a reduction of condenser requirements and less shock to the operator has been gained thru the use of lower open-circuit voltage. In reducing the amount of condensers required in comparison to the usual AC welders, the idle input current has been decreased considerably.

The "Fleet-Arc" AC welder, manufactured in 200, 300 and 500 amperage range, has both frame and housing of all-welded construction.



## SAVE Labor and Time

Eliminate  
heavy lifting.  
Cut handling  
costs. Table

swivels and locks in any position. Can be varied  $15\frac{1}{2}^{\circ}$  by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

*Send TODAY for illustrated  
catalog No. 2.*

**MIDWEST TOOL & ENG. CO.**  
112 Webster St., Dayton, Ohio

## Recondition \* Old Saws



*With the* **HOWE LINDSEY  
AUTOMATIC  
SAW SHARPENER**  
• HACK SAWS  
• BAND SAWS  
• CIRCULAR SAWS  
• MEAT SAWS

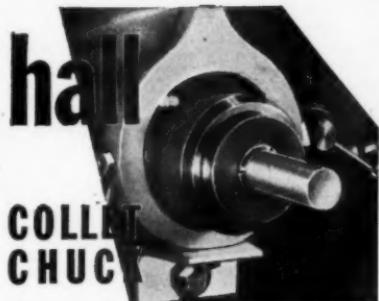
**HOWE AND SON** Inc.  
HINSDALE N. H.

## BAUMBACH THE DIE SET AUTHORITY



Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

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**COLLET  
CHUCK**

SPEED UP production in multiple operations with push-out type Hall Collet Chuck. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments...no bearings, friction, heat or loss of power. Instant release without stopping lathe.

Two-inch capacity, now only \$145

One-inch capacity, \$95

Round, square or hex collets, plain—serrated  
**HALL MANUFACTURING COMPANY**  
622 Tularosa Drive • Los Angeles 26, Calif.

## PROGRESSIVE SPIRAL END MILLS

A newly patented end mill with progressive spiral taper is being produced by the Helical Cutter Company of 15536 Telegraph Road, Detroit 23, Mich. This Company claims that the exclusive spiral of the Helical Cutter enables the cutter to shear evenly thruout the length of the cutting edge, and so cut faster and freer

chine shops and are specially suited for pattern work.

Helical End Mills are made of selected high speed tool steel with flutes polished out—thus eliminating excessive loading of flutes by non-ferrous metals. Helical End Mills are 4-fluted with right hand



with a much longer useful life. This end mill maintains an approximately constant helical angle through the cutting edge. And because of its developed spiral the Helical end mill has the same shearing action and cutting action at all stages of dulling, and can be faced and sharpened with the ease of a straight end mill. Helical end mills are ideal for all ma-

flutes—right hand cut. They are available for immediate delivery in sizes ranging from 1" to 6" flutes, with 1 degree to 3 degrees taper. The advantages of the Helical End Mill have been amply proved by actual shop use over a period of months. The manufacturer will gladly furnish additional information on request to Dept. BB.

## MOVIE SHOWS DETAILS OF AUTOMATIC TRANSFER MACHINE

The processing of refrigerator compressor housings by a new Greenlee 24-Station Automatic Transfer Processing Machine is shown in a 12-minute, 16 mm. sound film now available to interested groups.

This film demonstrates a method of reducing work handling in mass producing important peacetime products with the transfer machine. It depicts the 31 different machining operations performed by the 98½ foot giant with many close-ups showing individual heads, tooling, clamping features, and transfer mechanisms.

The film may be obtained on a loan basis by writing to Dept. BB, Greenlee Bros. & Co., Rockford, Ill. Requests should state the size of the audience that will view the film and the length of time it will be necessary to retain the film.

## ORGANIZATION CHANGE

Resumption of production and formal opening of its new 20,000 sq. ft. plant on January second has been announced for Steelware Mfg. Corp.

The firm, which has been manufacturing tool boxes and other sheet metal products for the past nine years, was previously known as Steel Products Mfg. Co., Los Angeles, California. The new plant is located on the outskirts of Los Angeles and will employ about 90 workers.

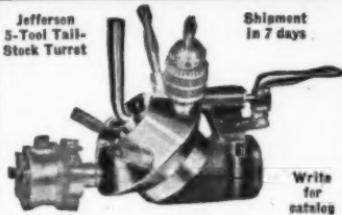
The firm also plans to expand its lines to include steel office equipment and products utilized in home construction, it was announced. Distribution will be widened thru a system of representatives and brokers so that in time the firm's products will be sold nationally.

It was stated that a stockpile of materials has been accumulated to permit uninterrupted production for a period of six months.

Jefferson  
5-Tool Tail-  
Stock Turret

Shipment  
in 7 days

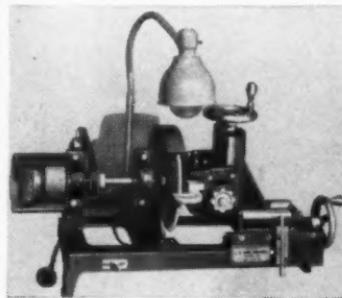
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catalog



6" PLAIN DIVIDING HEAD  
IMMEDIATE DELIVERY



JEFFERSON MACHINE TOOL CO., 700 W. 4th, Cincinnati 3, Ohio



Patent Applied For

### Sharpen Dull Pipe Wrenches

Industries save hundreds of dollars.  
Some "wrench shops" make \$50 a day.

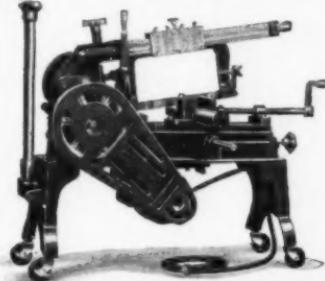
Write for information.

J. C. MOORE INDUSTRIES

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Low Priced      Self-Contained  
Portable      Sturdy

Ready to Work—Economical

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Write for Bulletin No. 200

**MILLER-KNUTH MFG. CO. OMAHA, NEB.**

# HIGH GRADE TOOLS & SPECIAL GAGES

AMERICAN TOOL WORKS, INC.  
26 FRANCIS AVE.

HARTFORD, CONN.

## MILLING MACHINE WITH ELECTRONIC CONTROL

The Reed-Prentice 12V Universal Head Milling and Die Sinking Machine is re-



ported to be an entirely new concept in vertical milling machines for toolroom work, especially in the making of plastic and rubber molds, die casting dies, forge dies, jigs and fixtures.

Quill type milling and boring head is mounted on adjustable ram. Spiral bevel gears on the spindle drive are designed to provide smooth, quiet power transmission to the spindle. All gearing is centrally located at front of machine and is readily accessible by the removal of one panel.

A push button control station is mounted on the column within easy reach of operator. All the controlling means are mounted on this station as indicated in picture.

Feed rate adjustments may be made while machine is feeding by operating the handy potentiometer knob, enabling operator to select most efficient feed rate when cutter is operating.

For further details write to Reed-Prentice Corp., Dept. BB, Worcester 4, Mass.

## MARQUEENCHING FURNACE

The furnace shown here is called a Marqueenching Furnace because the parts are quenched into the furnace and cooled to the point where they are at bath temperature and then cooled to the finished transformation of martensite.

The distinctive features pointed out for this furnace are the following:

1—A positive action pump which circulates the liquid completely every three and a half minutes.

2—A positive cooling area—by pumping into troughs and back over a spillway into the pumping section.

3—Additional cooling—by blowing air at 16 ounces of pressure for any volume under the spillway.

4—A positive method of filtering out hardening salt or scale by a series of screens.

5—Automatic control of temperature both in quenching area and cooling area.



A folder has been prepared to describe the use and advantages of this furnace. It may be had by writing Dept. BB, A. F. Holden Co., New Haven 8, Conn.

## SOLUBLE CUTTING OIL

Gulf Soluble Cutting Oil, a new cutting fluid, is announced by H. P. Hobart, General Manager of Lubricating Sales, Gulf Oil Corp., Dept. BB, Pittsburgh, Pa.

The new product is claimed to be the only soluble cutting oil which combines, together with all-water miscibility, the qualities of high lubricating value, extreme stability, pleasant odor, and non-foaming and rust preventive characteristics. The new oil is said to improve production, increase tool life, and reduce down time for tool changes.

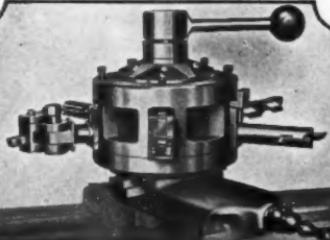
Further information will be furnished on request to the company.

## Producers of Screw Machine Products to Specifications

ONE, FOUR and SIX spindle automatics maximum capacity 2 $\frac{1}{2}$ " round. Hand Screw Machines and Universal Turret Lathes maximum capacity 3" round. Castings and Forgings machined maximum 10" diameter, 8" length, 15 pound weight. Secondary operation equipment for milling, drilling, tapping and assembling. Fabricators of aluminum, brass, steel and their alloys.

**SCREW MACHINE SPECIALTY CO.**  
5600 Butler St., Pittsburgh 1, Pa.

### 5 STATION LATHE TURRETS



Equip your machine shop or plant with these new improved Turret Heads

5 TOOLS IN POSITION  
FOR INSTANT CHANGE

ALLOWING MINUTE ADJUSTMENTS  
WITH 10 ACCURATE TOOL POSITIONS

Made in four sizes  
9 inch to 30 inch swing Send for complete  
folder of details

**AUTOMATIC MACHINE  
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REGULAR

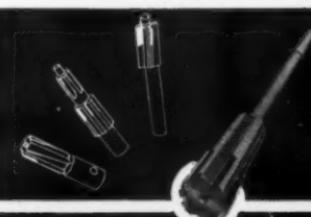
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SPECIAL DESIGN  
TO 24" O.D.

We also make Thrust Bearings interchangeable with other manufacturers.

We take in extra work on  
Blanchard Grinders.

**ACORN BEARING CO.**  
66 Stanley St. New Britain, Conn.



USE SCHMARJE  
CARBIDE-TIPPED  
HIGH PRODUCTION TOOLS

**SCHMARJE** TOOL AND ENGINEERING CO.  
MUSCATINE, IOWA

## AUSTRALIAN GEMS

By Jack Bowen

Australia produces other gems besides her renowned opals. Many of them go into jewelry, but others are put to more practical uses.

Australian diamonds, for instance, are among the hardest in the world and are put to unromantic but valuable uses in sharpening tungsten-tipped machine tools.

The first Australian diamonds were found nearly 100 years ago near Guyong (N. S. W.) by Edward Hargraves who made the first commercial gold find in Australia and started the great rushes in the 'fifties and 'sixties of the last century. Since then, other finds of diamonds have been made on the Gwydir River, one of the chief sources of commercial diamonds, at Beechworth, Koongbool, Benalla and Rutherglen in Victoria, at Pilbara in Western Australia, and on the Echunga goldfields in South Australia.

Some Australian diamonds are used as gems but most are put to commercial use. Australian commercial diamonds are exported all over the world. Many of them end up in diamond laps—the wheels of diamond dust used to sharpen the tough tungsten tips of machine tools.

Garnets, which are found chiefly in Central Australia and often loosely called "rubies" because of their blood-red appearance, are not always used for decorative purposes.

Only the finest are used as gem stones; the rest are ground to powder and used as an abrasive for engineering purposes.

Sapphires are mined in New South Wales and in Queensland. They have given their name to the town of Sapphire, near Inverell in New South Wales. The best sapphires are very good; the others end up as "jewels" or bearings in instruments where smooth and wear-resisting surfaces are needed.

Small quantities of agates, amethysts, beryls, chiastolite, emeralds, garnets, moonstones, olivines, rubies, topazes, tourmalines, turquoises and zircons have been found in the various Australian States.

It is difficult to get reliable figures of production of precious stones. The Commonwealth Official Year Book records only the sales reported to the Mines Departments in the various Australian States. Many of the most valuable stones are withheld from the market and are often sold privately. But on official figures, production of all other Australian stones lags behind that of opals.

Up to 1943, production (official) of opals was £2,000,000 (\$6,500,000); that of diamonds £150,000 (\$487,500)—(206,000 carats). There are no recent production figures of sapphires. The peak on Anakie (Queensland) field was in 1920, when £66,000 (\$214,500) worth was mined.

## HACK SAW BLADE NAME RESTORED

A new 4" x 8½" folder lists the hack saw blades and band saws manufactured by G. W. Griffin Co., Dept. BB, Franklin, N. H.

In calling attention to recent improvements, the manufacturers announce a return to the original trade name given their all-purpose hand saw blade, the New Griffin. This blade has also been referred to as the Griffin Soft Center, a phrase descriptive of its construction, a soft but tough-tempered center section combined with hard back and teeth. Further improvements are claimed to have given the New Griffin still greater flexibility and longer cutting life.

Copies of the new Griffin Price List may be obtained by writing to general sales agent, John H. Graham & Co. Inc., Dept. BB, 105 Duane St., New York 8, N. Y.

## TOP QUALITY CARBIDE

Send in specifications for  
free estimate on carbide  
use. Catalog sent on request.

- Immediate Delivery
- Lowest Competitive Prices
- Proven Performance

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CARBIDE CORPORATION

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Producers of CEMENTED CARBIDES in all forms



## ALL YOU WANT IN GEARS AT A SAVING!

Small or large gears, for the most severe duties, longest service. ABART gears exactness and precision approved by thousands of users. Spur, bevel, worm, helical and spiral, internal, of any gear material. No stocks.

Send B/P or specifications for quotation.

### ABART GEAR AND MACHINE CO.

*Mfrs. of Speed Reducers and Gears*  
4832 W. 16th St., Chicago 50, Ill.



### *The Standard of QUALITY*

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest quality and service at attractive prices.

*Write today for prices. Few Territories Open.*

**QUALITY TOOL WORKS**  
Market St., Waukegan, Illinois

## New Britain UNIVERSAL VISE THE ORIGINAL

Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.



*Write for  
Further  
Information.*

**NEW BRITAIN TOOL & MFG. CO.**  
NEW BRITAIN, CONN., U. S. A.

## OPEN THE WAY TO GREATER PROFITS



BUTTS AND CONTINUOUS LENGTHS — *for GUARDS — CABINETS — CASES — BOXES — LUGGAGE*

*WRITE FOR CIRCULAR*

**S & S MACHINE WORKS**

HARDWARE DIVISION

4539 WEST LAKE STREET

CHICAGO 24, ILLINOIS

## REDESIGN OF POLISHERS

The Standard Electrical Tool Co., 2509 River Road, Cincinnati 4, Ohio now have a redesigned 2 hp and 3 hp Infinitely Variable Speed Buffing and Polishing Machine.



While the illustration is of the enclosed spindle construction with four ball bearings, sight feed oil gauge on each bearing housing and shaft lock, this machine is also available with exposed or open spindle.

The enclosed ball bearing motor is on an adjustable base attached to the back of the pedestal, with power transmitted to spindle thru belted drive.

Any spindle speed between 1500 and 3000 rpm is instantly available, by turning the "Speedial" control. Each change in spindle speed is immediately recorded on the dial.

The drive is guarded and equipment includes a push button safety starter having overload protection.

There are nine models, ranging from 1 hp to 15 hp.

## LABELS FOR METALS

A "self-destroying" label has recently been added to the line of self-adhesive Kum-Kleen Labels manufactured by Avery Adhesive Label Corporation, Dept. BB, 36 W. Union St., Pasadena 1, Calif. While they retain the Kum-Kleen advantages—adhere without moisture to any smooth, clean surface, will not pop or curl off yet easily peeled off without leaving a mark—a further feature of these "self-destroying" labels prevents their

reuse once they are removed.

Like all Kum-Kleens, these "self-destroying" labels may be applied to metal, plastic, wood, glass or cellophane. Unless their removal is desired, they will adhere permanently despite intense heat, cold or humidity. Further information may be obtained by writing the manufacturer.

## CONNECTOR KIT

The new Hylug Connector Kit, just announced by Burndy and available to industry thru regular electrical wholesale channels, contains everything necessary for making small-wire solderless electrical connections.

The Kit contains 325 assorted Hydent connectors for conductors No. 20 thru No. 10 wire; as well as a standard Burndy Hytool for installing the connectors. The connectors are packed in attractive and durable plastic jars as illustrated; containers which will withstand much hard usage.

It is pointed out that these connectors are of pure-copper, one-piece construction, with no extra parts which might loosen and cause increased resistance. When these one-piece connectors are indented with it they are virtually 'coined' to the conductor, providing a connection high in mechanical strength and electrical efficiency.

The Kit affords contractors, industrial maintenance departments, radio, automotive and appliance servicemen a compact and convenient connector assortment for all small wire installation and repair jobs. Full information can be had from Dept. BB, Burndy Engineering Co., Inc., 107 Bruckner Blvd., New York 54, N. Y.

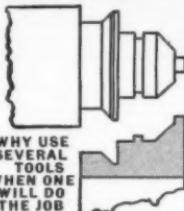
## MATERIALS HANDLING BULLETIN

A bulletin which describes and illustrates their line of materials handling equipment has been issued by the Metzgar Co., Dept. BB, Grand Rapids 4, Mich.

The equipment of this company includes Gravity Conveyors, Endless Belt "Power Helpers," End-Wood Wheels, End-Wood Wheel Casters and Cable Reel Dollies.

They report that all their products are quality built, smooth running and perfectly balanced.

The bulletin is so arranged that the many types of handling devices may be easily seen, and specifications are included to be of further aid.



WHY USE  
SEVERAL  
TOOLS  
WHEN ONE  
WILL DO  
THE JOB

79 NEWBRIDGE ROAD

## FORM GROUND CARBIDE AND HIGH SPEED TOOL BITS

TERRITORIES OPEN FOR LIVE REPRESENTATIVES

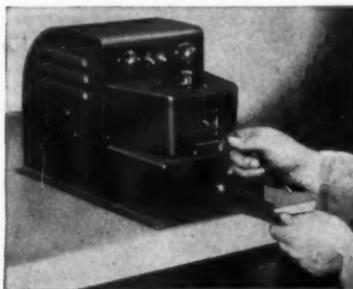
NEW MILFORD CARBIDE TOOL CO., INC.

NEW MILFORD, N. J.

### "HOT BLADE" WIRE STRIPPER

A new "Hot Blade" Wire Stripper for continuous production stripping is announced by Ideal Industries, Inc., 1441 Park Ave., Sycamore, Ill.

Thru use of two electrically heated



stripping blades, the unit will strip cotton, silk, synthetic (plastic) insulation or rubber covering from fine stranded or solid conductors without injuring the wire.

Since different wire insulations strip differently, each blade has an individual

heat control and transformer to permit raising or lowering the burning temperature as required. The blades may be set at exact wire diameters, and an easily adjustable stop controls the length of stripping. This stripper is easily installed on present production line bench or table. 115 volt, 50-60 cycle standard, other voltages and frequencies available.

### TOGGLE MACHINE

Beatty Machine & Mfg. Co., Dept. BB, Hammond, Indiana, announces a new size 12 Toggle Machine, designed to handle a wide range of structural steel shapes and sections for both flange and web punching in one handling. Special tools covering a wide variety of punching requirements can be applied on this machine; die space can be modified if wider ram face is required. Punching tools with double-gag punching and die holders provide two diameters on each pitch line, which saves time and eliminates re-handling, since the two diameter holes can be punched on the same pitch line without loss of time spent in changing tools. Control levers for duplicate punching are provided. The machine is said to be fast, occupies a small floor area.

# "STAR DUST"

LABORATORY GRADED  
PURE DIAMOND POWDERS

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indispensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

- Absolute control of particle sizes
- Complete absence of out-size particles
- STAR DUST sizes as fine as .0001"
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*There is a STAR DUST Field Serviceman in your territory.*

STAR DUST speeds up production enormously and produces finishes and super-finishes down to less than .000004 of an inch.

Precision LAPPING  
POWDERS for  
PRECISION work



ACE ABRASIVE LABORATORIES

ONE SPRUCE STREET  
NEW YORK 7, N.Y.

## ULTRASONIC MATERIALS TESTER INTRODUCED BY G. E.

A new ultrasonic materials tester designed to indicate the presence of voids, cracks, porosity, laminations, poor bonds, and other internal flaws in metals, plastics, and ceramics has been introduced by the Special Products Division of the General Electric Company. The tester is useful in production testing of metal castings, forgings, or finished machined parts, as well as plastic or ceramic parts.

The new tester sends a beam of ultrasonic waves thru the specimen being tested. Changes in the amount of energy transmitted thru the specimen are an indication of the presence and extent of flaws. The tester is portable and self-contained, easy to use, and provides a direct reading. Testing is not affected by small changes in dimensions or position of test pieces.

The new instrument consists of a complete wide-band ultrasonic transmitting-receiving system having a high-frequency generator, a crystal transducer for producing ultrasonic vibrations, a satisfactory medium such as water to transmit these vibrations, a second crystal transducer to convert the received mechanical energy into electrical signals, and an indicator supplying information for materials inspection or analysis.

To examine regularly-shaped specimens, the two transducers are immersed in a tank containing water, and the specimen is inserted between them. Ultrasonic waves are then sent thru the specimen, and the resulting reading on the indicating instrument is compared with that for a specimen shown to be sound by X-ray, mechanical breakage, or sectioning methods. Internal flaws will produce measurable decreases in total transmission of waves thru the specimen, and a consequent drop in the instrument reading.

The instrument can also be used to indicate changes of viscosity, compressibility, and density of liquids, when these significantly alter the velocity or attenuation of ultrasonic transmission.

Write Dept. BB for further information.

### "N" PRODUCTIMETERS

The Durant Manufacturing Co., 1928 North Buffum St., Milwaukee 1, Wis., announces a new series of double deck rotary and stroke counters, made in both conventional and predetermined types, designated as the "N" Series.

These new models are designed to fulfill the requirements of the ever-increasing speeds of modern production machinery, as well as future requirements of machines not yet off the drawing boards. The manufacturers report the design embodies several refinements for better appearance, higher speeds, and simplicity in construction. The case and front and back covers are of aluminum for light weight. Clean cut of louvres permits easy reading.

Rotary models are double worm drive for smooth action and high speeds. Stroke models are designed so that the upper row is chain driven for quiet, easy operation at high speeds. Predetermined models have a simplified switch mechanism for light operations and positive switch action at the predetermined count.

Double Deck Productimeter counters are increasingly in demand on many industrial applications because of the advantages offered by the totalizing counter. The unit provides for a register of current runs, and daily, weekly or monthly production totals. Complete details will be sent upon request.

### VOLTAGE CONTROL

A new 12-page bulletin has been released by The Superior Electric Co., of Bristol, Conn., specialists in the manufacture of voltage control equipment.

The bulletin illustrates and describes Seco's complete line of Powerstat variable transformers, Seco Automatic Voltage Regulators, Voltbox a-c power supplies, and special custom-built equipment such as remote positioners.

Detailed description including many charts, graphs, and dimensional drawings makes this bulletin complete for engineers seeking the answer to voltage control problems.

### CLOSE COUPLED CENTRIFUGAL PUMPS

The Quimby Pump Division of the H. K. Porter Company, Inc. has just released an 8-page pamphlet on their Close-Coupled Centrifugal Pump.

Designated as Model "Q", the pump is designed for general service with capacities from 10 to 1000 G.P.M. This pamphlet may be obtained by writing to the H. K. Porter Company, Inc., Dept. BB, 1932 Oliver Building, Pittsburgh 22, Pa.

### HAND-OPERATED GRINDER

Supplementing their line of fully hydraulically operated surface grinders, The DoAll Co., Dept. BB, Des Plaines, Ill.,



announces the addition of Model GH hand operated Tool Room surface grinder.

This new grinder features smooth, easy table action. Hardened gears running in needle bearings and driven by a 16" properly located hand wheel makes this possible. The 1" cross feed screw, located in the center of the saddle, assures a smooth accurate cross feed action.

The working area of the table is 6½" x 19¼" with a maximum work height of 12" using the standard 7" x ½" x 1¼" grinding wheel.

DoAll electro Magnetic chucks, ac-dc rectifiers and demagnetizers, Dust Collectors, Grinding Wheels and wheel dressing diamonds are available for the Model GH.

### POWER TRANSMISSION CATALOG

A new 320 page General Catalog No 54, on Boston Power Transmission Equipment and Component Machine Parts, contains complete specifications and list prices on all stock sizes of Gears, Worms, Chain and Sprockets, Reductors (Speed Reducers), Ratiomotors (Motorized Speed Reducers), Couplings, Collars, etc.

For your copy of this new catalog write to Boston Gear Works, Inc., Dept. BB, North Quincy 61, Mass.

## The Answers To Your Labor Problems

Knottiest problems on the management horizon today have to do with labor. The most successful solutions are those drawn from others' experiences. Put your plant managers and foremen in a position to handle labor situations effectively by placing these books in their hands.

**"How to Handle Collective Bargaining Negotiations"** . . . An indispensable guide to the conduct of labor negotiations, prepared by the editors of the Executive's Labor Letter. Points out errors of management in the past and how to avoid them in the future. Recommendations from men who have spent thousands of hours around the bargaining table. 42 sheets multigraphed on rag stock. Bound in multi-binder. . . . . \$5

**"Labor Arbitration: Principles and Procedures"** . . . an outstanding manual by Dr. John A. Lapp, outlining labor procedures, how to prepare adequately for grievances, discharge, discipline, and other contract matters to be arbitrated. Includes numerous examples of actual arbitration forms. 231 pages, cloth bound. . . . . \$4

**"How to Handle Labor Grievances"** . . . A practical treatment of the problem by Dr. John A. Lapp, based on actual experience and the review of hundreds of cases. Five sections. Appendix illustrates 23 grievance forms. Cloth bound, 294 pages . . . . . \$4

**"Problems of Seniority"** . . . Deals with transfers, leaves of absence, grievance procedures and seniority disputes, how seniority is lost and acquired. Cloth bound, 295 pages, fully indexed, 5½x8½ in. . . . . \$4

**"The Federal Labor Laws"** . . . makes clear the rulings and implications of the National Labor Relations Act, Wage Stabilization, Social Security Act and other labor laws. Loose-leaf, hard fabrikoid cover, 6½x9½ in., 82 pages. . . . . \$2.50

Enclose remittance with order to

*Van Kampen Press*  
542 S. Dearborn St. Chicago 5, Ill.

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## Pres-Vac



SAFETY FEEDER  
KEEPS  
HANDS  
OUT OF  
DANGER ZONE

YOU owe it to your workmen—to safe, fast production—to keep their hands out of danger zone—with the Pres-Vac Safety Feeder. Vacuum pick-up. Handles flat pieces of various weights and sizes. Trigger action. Me. Request mechanical Pickers available. Bulletin

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## SPEED-UP DRILLING AND TAPPING JOBS

The easiest way to cut production costs on drilling and tapping jobs is to use John's Drill Jigs.

These sturdy Jigs are now provided with universal jaws which permit quick setting for end drilling and tapping. The reversible V-plates accommodate a broad range of diameters.

Let us send details.

**HEUSER MFG. CO.**

1638 N. Paulina St. Chicago, Ill.



## YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Open: inches	Weight Pounds
1D	3 1/2	3 1/2	12 1/2
2D	5	5 1/2	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

**YOST MFG. COMPANY**  
1335 SO. MAIN ST.  
MEADVILLE, PENNSYLVANIA

## NIELSEN Heavy Duty Live Centers

Write for catalog on live centers

Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

**NIELSEN, INC.** LAWTON, MICH.



# Available LITERATURE

## OIL PURIFICATION

A four-page folder issued by Honan-Crane Corp., a subsidiary of Houdaille-Hershey Corp., is intended to point out to operators the way to stop down time



and expensive repairs on hydraulic presses, machine tools, etc., by effective purification of hydraulic oils.

The folder discusses first the common forms of contamination which cause hydraulic equipment to operate inefficiently. Following this is an explanation of Honan-Crane oil purification and what it accomplishes in the way of removing all forms of contamination from hydraulic oils.

For a copy of this folder write on your company stationery to Honan-Crane Corporation, 911 Sixth St., Lebanon, Ind.

## BOOKLET ON "PACKAGE UNITS"

Ex-Cell-O Hydraulic Power Unit Bulletin 45361 is a new 16-page booklet including engineering information, installation drawings and application photos of the three sizes of "package units" for feeding and rotating cutting tools.

Complete particulars are given in the

publication on the new Style 20 Hydraulic Power Unit (15 $\frac{1}{4}$ " overall length)—the small compact unit for high spindle speeds and fast cycles.

Write to Ex-Cell-O Corp., Dept. BB, Detroit 6, Mich.

## LIFT TRUCK LITERATURE

Hydraulic Pallet Lift Truck is fully described by a new bulletin. Photographic illustrations showing method of operation with pallets, recommended pallet construction, and adaptability of various materials to palletizing make this bulletin of special interest to anyone concerned with pallet handling.

Write for your free copy of Bulletin 220 to Lyon-Raymond Corporation, 550 Madison St., Greene, N. Y.

## "LOW TEMPERATURE" WELDING RODS

A new brochure, "Here Is Information On Eutectic", contains factual and technical data about Eutectic "Low Temperature" Welding Rods and Fluxes for torch and furnace and "LowTemp" Eutectic Rods for arc welding.

This booklet gives specific applications where "Low Temperature" Welding Alloys can be used to good advantage, suggests which welding rod or electrode is best suited for the particular job and lists complete technical information.

This publication may be secured by writing to Dept. BB, Eutectic Welding Alloys Corp., 40 Worth St., N. Y. 13, N. Y.

## CASE HISTORIES

A new series of case histories is being prepared by the Bellows Senacon Co., 798 N. Main St., Akron, Ohio.

These case histories are prepared to show how air may be used to speed up many types of production. These are available without cost from Dept. BB of this company. The case histories emphasize how the use of air motors may speed production and cut cost.

# Precision . . . . TAPPING

Leads  
changed  
in 90  
seconds



## M & L PRECISION TAPPER

This is a fast rugged production tool capable of sustained accuracy. Flexible and adaptable, it cuts clean screw threads, handling up to  $\frac{3}{4}$ " in non-ferrous metal and 0 to  $\frac{1}{2}$ " in SAE steel. Class 3 and Class 4 gage fits and high production schedule are accomplished in normal operation even with unskilled help.

Tapping speeds are 95 to 350 rpm with reverse speed twice that of forward speed. Taps are guided by precision ground lead screws which are easily and quickly changed. Bulletin 143 gives full details.

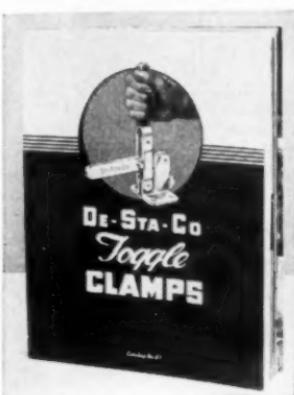
Dealers' inquiries  
are invited

**LECKINGER**  
MACHINE AND EXPERIMENTAL CO.  
716 N. Highland Ave., Los Angeles, Calif.



## CATALOG OF CLAMP LINE

Detroit Stamping Company, manufacturers of quick acting clamps for industry, have issued their 32-page 1947 catalog of De-Sta-Co Toggle Clamps. Of interest to



machinists, tool and production engineers and others whose problems include the holding of parts in production, it contains detailed specifications of the entire clamp line, illustrations of many applications.

A section is devoted to data on arbor spacers, shims, shim and feeler stock and miscellaneous job stampings. Write for Catalog No. 47, Detroit Stamping Co., Dept. K, 312 Midland Ave., Detroit 3, Mich.

## DIE CASTING MACHINE

A 6-page folder describing its fully automatic high speed low cost die casting machine has been released by Light Metal Machinery, Inc.

Sequence photographs of this zinc, lead and tin die casting machine show how its patented cycling mechanism provides automatic die movement, shot and ejection in continuously repetitive cycles.

Shot capacity of the machine is listed at 16 ounces, with a casting area of 30 sq. in. Typical castings produced by users of the low cost machine are illustrated. Smallest casting shown from a single cavity die weighs  $\frac{3}{4}$  ounce and was produced at 720 shots per hour. Largest casting shown weighs  $9\frac{1}{2}$  ounces, run at 240 shots per hour in a single cavity die. Multiple cavity castings produced at other speeds are also shown.

A copy of the booklet, "Fully Automatic Die Casting with the Work Horse",

may be obtained by writing to Light Metal Machinery, Inc., Dept. BB, 736 Pen-ton Bldg., Cleveland, Ohio.

#### ELECTRICAL EQUIPMENT

"More Power to U.S.A." is the title of a new 32-page bulletin released by the Allis-Chalmers Mfg. Co., Dept. BB, Milwaukee, Wis., which describes and por-



trays the company's products commonly used on generating, substation, transmission and distribution systems.

The bulletin presents Allis-Chalmers equipment available for power generation and distribution, ranging from steam and hydraulic turbines, turbo generators, engine type generators and condensers and auxiliaries to pumps, water conditioning, motors, motor control, switchgear, circuit breakers, power and distribution transformers and unit substations.

While the extent of the company's line of equipment for the electric power industry is not given in detail in "More Power to U.S.A." it does provide a comprehensive overall view of Allis-Chalmers' contribution to the field.

#### COMBINATION TABLE & CONVEYOR

An 8½ x 11, two colored 8 page bulletin (PF-8) featuring an "All-Purpose Conveyor, Mechanized Work Table for Assembly, Inspection and Packing Operations—a Unitized Assembly or Production Line Unitable," has just been issued by Island Equipment Corp., Dept. BB, 101 Park Avenue, New York 17, N. Y.

## There's No "CURE-ALL" IN CUTTING OIL SANITATION

Coolant Formulations and shop conditions vary widely—so do coolant handling problems. To prevent costly coolant spoilage with its foul odors and other disagreeable features, to maintain practical sterility, your Dolge Service Man is prepared to render this service:

- 1—He will take samples of your coolant.
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Only then, and when found necessary, the particular DOLGE STERIDOL GERMICIDE to fit your requirements will be recommended. Employed as directed, the preparation will not irritate the skin or corrode metals . . . and it will prevent spoilage.

**The cost? Less than 1 cent per gallon of coolant!**

*Write for booklet,  
"Cutting Oil Sanitation."*

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**STERIDOL**  
Cutting oil germicides



**IT'S PROFITABLE  
to MILL SMALL PARTS  
with this NEW Rouse  
HAND MILLER**



**\$98 (Without Fixtures)  
F. O. B. Chicago. Motor Extra**

• Anyone can operate this high-speed motor-driven unit with speed and accuracy. It pays you extra profits in fast, low-cost finishing light cuts on aluminum, brass, steel and other metals . . . also, rounding and burring steel and cast iron. A handy machine for second operations on plastics.

With Rouse Fixture Set-Ups—the Rouse Hand Miller has added capacity for precision milling of a large variety of small parts for instruments, electrical work, aviation components, etc.

Immediate shipment can be made.  
Write for illustrated folder and full details.

**H. B. ROUSE  
AND COMPANY**  
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**Rouse**  
Fixture Set-Ups  
that Speed  
Production



#### CEMENTED CARBIDE CHART

A comparison chart has been issued for Cemented Carbide Grades. This chart shows the range of cemented carbide grades produced by leading manufacturers, the designed application of each, materials to be used, Rockwell hardness, and the best equivalent competitive grade.

These charts are available without cost from the Adams Carbide Corp., Dept. BB, 40-30, 23rd St., Long Island City 1, N. Y. This chart should prove a very useful reference.

#### LUBRICATION BOOKLET

A booklet, entitled "Steel Mill Lubrication," dealing with centralized lubrication systems as applied to blooming mill operation, has been published by the Shell Oil Co., Inc. It is one of a series of booklets in Shell's "Facts That Help" series, which describe lubrication problems encountered in various industries.

This booklet summarizes the characteristics a lubricant must possess in order to lubricate all of the bearings of a blooming mill properly. It features the operation of the blooming mill because this mill typifies many of the lubrication requirements of the steel industry.

Copies may be secured on request from Lubricants Dept. (BB), Shell Oil Co. Inc., 50 W. 50th St., N. Y., N. Y.

#### MATERIALS-HANDLING CATALOG

Elwell-Parker Electric Co., builder of power industrial trucks and cranes, has issued a new catalog of basic models for 1947.

Illustrated, with principal specifications, are 31 models including low-lift, with and without crane units; high-lift platform trucks; fork-type; cranes; stationary-bed load carriers and tractors, etc.

The complete line provides engineered equipment for practically every materials-handling job within the field of industrial trucks and cranes. Copies are available from Elwell-Parker Electric Co., Dept. BB, Cleveland.

#### SPRING LOCK WASHER

Reasons for the use of spring lock washers and when they should be used are described in a technical booklet recently published by the Geo. K. Garrett Co., Inc., Dept. BB, 1421 Chestnut St., Philadelphia 2, Pa.

The primary and secondary zones of power in a fastening device are described. Spring lock washer specifications and

tests which may be performed are included.

This company will have a representative perform a test with the Diamond G Lock Washer to compare it with other types of washers. This type of washer is claimed to provide great protection against wear and stretching. It is also designed to minimize or eliminate rust, corrosion and vibration.

These and other Diamond products are available for delivery. For this booklet and other information write directly to the manufacturer.

#### FLUID MOTORS

A bulletin has been issued describing the fluid motors for stepless speed variation manufactured by Denison Engineering Co., Dept. BB, Columbus 16, Ohio.

This bulletin illustrates and describes the parts used in this motor. The manufacturers maintain that the "floating drive" is designed to end shock-load problems and provide constant pressure that eliminates backlash and inertia. The motor may be used wherever rotary power can be applied. The manufacturers state that high efficiency and flexibility in application are but two of the many outstanding features of this motor.

#### WORKERS INSURANCE

How to save money on workmen's compensation insurance—a 16-page compilation of case histories illustrating how a saving of 37.9% was achieved by the average of all companies using the A. S. C. S. Plan has just been published by Associated Safety and Claims Services, Inc., 123 William Street, New York 7, N. Y. Copies are available on request.

#### ANOTHER EDITION OF SPRING HANDBOOK

Accurate Spring Mfg. Co. announces the publication of the third edition of their Handbook of Technical Data on Springs. This 36-page handbook offers clear, concise data on such subjects as design formulation, load deflection, and the proper methods of specifying springs. Several helpful short cuts for making spring calculations are also presented. All engineers and designers who use springs should find the handbook very valuable.

Copies of the handbook may be obtained free of charge by writing Accurate Spring Mfg. Co., 3811 W. Lake St., Chicago 24, Ill.

## Motorized HOPPER UNITS

*Speedy  
Sturdy  
Dependable*

*Easily adapted to presses, centerless grinders, thread rolling and slotting machines or special machine. Made in four diameters, 10", 12", 16" and 24".*

#### FEEDS PARTS WITH SURPRISING EFFICIENCY

Screws, Screw Blanks, Rivets, Pins, Discs, Nuts, Bearing Rollers, Steel Balls, Washers, and special parts adaptable to hopper.

*Made in 4 Diameters, 10", 12", 16", 24"*

*Send Samples for Details and Prices*



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*Immediate Delivery  
FROM STOCK*

 No waiting when you order Greaves Silent Bakelite Gears. • We have them in stock NOW! • Your order will go forward immediately. • You'll appreciate the silent operation and added smoothness provided by Greaves Silent Bakelite Gears. • You'll marvel at their great strength to carry big power loads . . . their remarkable ability to successfully operate completely submerged in water. • You'll welcome their low cost. • No metal reinforcements required. • Save Time . . . Money . . . Labor!

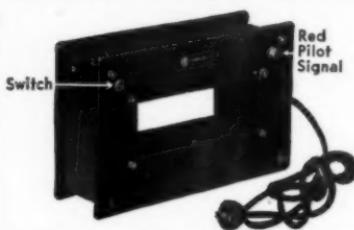
We also make silent gears of rawhide and Fibarol.  
Write for Circular.

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Cincinnati, Ohio



**AMC Quick  
DEMAGNETIZER**



A necessity where machine tools are used.

Standard units available and special sizes to order.

*Write today for descriptive circular.*

**ALOFS MFG. CO.**  
1629 Madison Grand Rapids, Mich.

SEND US YOUR PRINTS FOR Quotations

**THREAD GRINDING**

*Also Internal, External  
and surface grinding.*

**BROACHING**  
**SCREW MACHINE PRODUCTS**  
**MAGNETIC INSPECTION**

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**SPUR** **WORM**  
**BEVEL** **HELICAL**

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MACHINE COMPANY  
MANUFACTURERS OF  
AVIATION & AUTOMOTIVE PARTS  
Gear Specialists  
1917 EAST 61<sup>st</sup> ST. • CLEVELAND 3, OHIO

# NEW TECHNICAL BOOKS

## PRECISION HOLE LOCATION FOR INTERCHANGEABILITY IN TOOLMAKING AND PRODUCTION

By J. Robert Moore. 184 pages of hole location tables by W. J. Woodworth. The Moore Special Tool Company, Bridgeport, Conn. 448 pages. Illustrated with photos and drawings. \$3.00 in the U. S. \$3.50 outside the U. S.

Here is a comprehensive review of all hole location practices and their evolution to the point where the toolmaker can now employ engineered methods and apply the principle of interchangeability to his own operations. The book reviews all of the laborious and time-consuming hole-location methods used prior to the development of modern hole-location equipment. Comparisons are made between the old methods, many of which are still being employed today, and new methods on actual jobs.

After tracing the long-delayed evolution of the jig borer and analyzing different types, a chapter entitled "Jig Boring Practices," which alone contains over 100 photographs and drawings, presents instructional and operational short-cuts dealing with a whole range of tools and dies, and gives time estimates on a variety of different jobs.

Grinding is as essential to the hole locating problem as boring, the author

points out; because after the toolmaker "has done a beautiful job of boring the holes, heat-treating usually results in distortion or decarburization, or both." As a result, an extensive chapter, headed "Hole Grinding in Jig Time," describes in detail the modern methods for finish-grinding holes in hardened parts.

In the concluding chapter, "Now-Interchangeability in Toolmaking" — the toolmaker is shown how to get the most out of modern hole location machines — boring and grinding — by using them as partners, working together. "Interchangeability is now so firmly entrenched," writes Mr. Moore, "that its acceptance is mandatory to any progressive industry. Why not toolmaking? The toolmaker's conception of his work has always been a one-at-a-time proposition made to fit instead of to figures. He has apparently overlooked the fact that tool parts, if made strictly to dimensions, will assemble and operate just as well as any other manufactured device."

W. J. Woodworth, a toolmaker, tool designer and tool supervisor of 40 years' experience, recognized the difficulties in laying out holes on circles. With his son he developed tables calculated in rectangular coordinates for circles divided into 3 holes up to and including 100 to enable jig borer operators to obtain the correct figures with the least

effort. The tables and drawings are available in this book for the first time.

Not only does this volume fill a long-felt need for a method of mass producing dies, jigs and special tools, it also shows the tool maker how to proceed with mass production on methods. The book is "must" study.

Fred Wittner Advertising Agency supervised the organization of material and the production of the book.

## • • • HOW TO SUPERVISE PEOPLE IN INDUSTRY

*By Dr. Eliot D. Chapple, President, The Chapple Company, and Edmond F. Wright, Assistant Dean, Harvard University, Graduate School of Business Administration. National Foremen's Institute, Deep River, Conn. 117 pages. \$2.50.*

The book is divided into four sections: The Job of Being a Foreman; How Production Affects Human Relations In the Department; Effective Handling of People; Why the Foreman Can Make or Break An Organization.

For many years the criterion for a man's qualifications for a foreman's job was his job knowledge. Did he know his machines? how to get out production? was his experience thorough? had he served an apprenticeship? The majority of industrialists believed the answers to these questions constituted an accurate index to a man's ability to discharge a foreman's duties. Recent years have witnessed an addition to these qualifications; a man, to become foreman today, must be well grounded in the skill of handling people, a knack which many of the old line foremen lacked. To enable a foreman or a foreman-to-be to understand the principles underlying the handling of people is the purpose of this volume.

Such subjects as: records, interviewing applicants, job descriptions, rates,

changes, relationships, unions and time and motion studies are adequately covered. Sample interviews for hiring are discussed. The book furnishes a breakdown of personality problems encountered during the interview, covering the applicant's behavior at an interview, the characteristics of his personality and an analysis of handling the various types of personality problems. The book is written in simple, clear language.

The subject of handling people covers practically one third of the book, bearing testimony to the value of this subject.

## • • • RARER METALS

*By Jack De Ment, Research Chemist, Fluorescence Laboratories, and H. C. Drake, Editor, The Mineralogist. Introduction by Prof. Colin G. Fink, Head of the Department of Electro-chemistry, Columbia University. Chemical Publishing Co., Brooklyn 2, New York. 432 pages. Illustrated with tables and photos. Bibliography. \$7.50.*

The outstanding characteristic of the metallurgy of the twentieth century is the commercialization of a large number of rare metals: rhodium makes the best mirrors; columbian corrects the intergranular corrosion of stainless steel; tellurium improves the qualities of lead and of rubber; tungsten makes our toughest steels; beryllium renders copper hard and fatigue-resistant; barium is our best electron transmitter; uranium is the most fascinating of all rare metals. In this concise book the mineralogy, chemistry, physics and technology of these less familiar elements are described.

This volume correlates basic data on rarer metals for the busy professional man and student. It is suitable as a reference text or for supplementary reading in science and engineering courses. Special consideration has been given to

rarer elements upon which much of our future progress may depend.

Some twenty elements, excluding the metals of the rare earths on which there is extensive literature, are discussed briefly, including some interesting and important practical application of these elements.

The book does not give a survey of analytical methods, which may be found in any standard reference work on analytical chemistry; but newer tests, such as those of micro-chemistry and fluorochrometry, are discussed. The stress has been laid upon specific tests which can be performed rapidly with simple equipment and resulting in satisfactory experiments.

Among the metals discussed are: beryllium, gallium, indium, thallium, silicon family, vanadium, columbium, tantalum, molybdenum, tungsten, uranium, selenium, tellurium and the platinum group.

A typical grouping of a chapter follows this pattern: history, mineralogy, physical properties, chemical properties, technology, analysis, literature cited.

Appendices include an Abridged Bibliography of the Rarer Elements, Abundance of Elements in Igneous Rocks, International Table of Atomic Weights, The Periodic System of the Elements.

#### PLASTIC SPACERS

Industrial Products Suppliers announces service to users of slitting machines. Developers of the Artus—"The Color Tells the Thickness" Plastic Arbor Spacers and Shim Stock, Industrial is now ready with a complete range of sizes for use on slitting machines. The new Artus Slitting Machine Spacers are available in any size up to 20" diameter.

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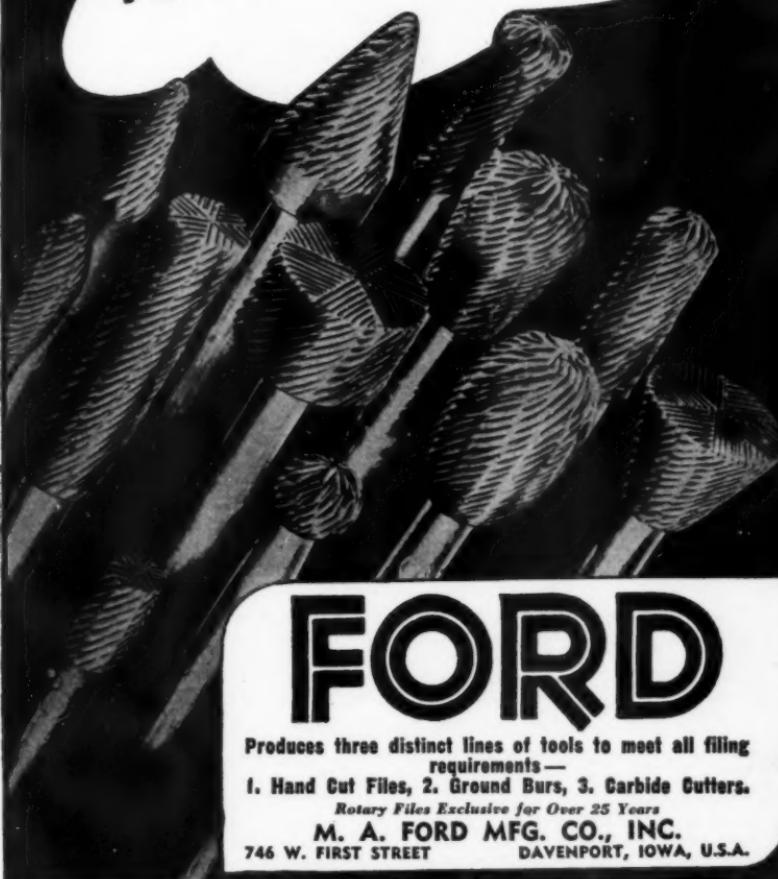
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## PRECISE 40

### TRAINING OF VETERANS

Some disabled veterans, who need more than the usual four years of training to reach their occupational objectives, may be able to take additional training under the Vocational Rehabilitation Act, (Public Law 16), Veterans Administration said.

Veterans so severely disabled that no course of training will restore them to employability in four years, and those who lose time in their courses because of their health or other personal circumstances beyond their control, are expected to be helped by this ruling, VA said.

Provision also has been made for dis-

abled veterans who started pre-professional courses before the war and who have since proved their suitability for their chosen profession, but who still must have more than four years to prepare for it.

Veterans Administration has notified all field offices of circumstances under which the additional training can be given. Its instructions are based on the Vocational Rehabilitation Act, amendments to the act, and an official opinion of the VA solicitor.

VA pointed out that the ruling does not apply to any veterans in training under the G. I. Bill whose eligibility is based on their length of service up to a maximum of 48 months of training. It will not affect the majority of disabled veterans enrolled under the Vocational Rehabilitation Act, but only those in special circumstances.

Under this Act, VA is responsible for studying and testing the disabled veteran and helping him select an employment objective which is in line with his skills and suitable to his disability.

VA then is responsible for planning and enrolling him in a course of rehabilitation training that will enable him to reach his objective and become employable, generally within the four-year limit.

VA pays tuition and fees, provides books and supplies, pays a subsistence allowance to give the disabled veteran a living income until he is employable again.

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### DIAMOND COMPOUND

A diamond polishing compound that has proved its worth in the exacting art of fashioning accurate parts for fine watches may turn in revolutionary performances in the entire field of precision manufacture, according to Roger F. Waindle, general manager of the Sapphire Products Division of Elgin National Watch Co.

Elgin officials claim that after several years' use in Elgin's plant and also by manufacturers of precision steel and tungsten carbide products, it is definitely proved that the new compound can effect economies ranging to as high as 50%.

The savings are said to result primarily because of fool-proof uses of the compound, and the speeding-up of processes which reduce man hours of labor.

According to the watch company officials, manufacture of the compound fits naturally into the division's work with sapphire, a material so important in wear resisting bearings of fine watches and which daily discovers more general industrial applications for its extraordinary low friction, high hardness, non-porosity, and wear-resistant qualities.

Sapphire can be worked economically only with diamond, they explained. Sapphire Products division of Elgin has for many years produced diamond-charged saws, grinding wheels, laps, and special grinding tools. Now it is using the compound for final polishing of such new industrial sapphire products as jewel bearings, precision gages, and machine wear parts.

Photomicrograph reproductions of the new diamond compound are pointed to as tangible evidence of its size uniformity, cleanliness and efficiency. The even surfaces assure that practically all particles will cut, resulting in a finish that is high and uniform without scratching or pitting.

The plant's diamond department currently produces six grades of powder besides the regular sieve sizes. It furnishes graded diamond powders to all the Elgin watch factories and to numerous outside factories.

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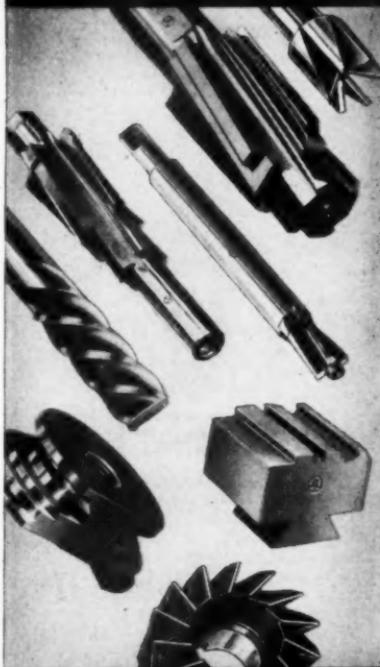
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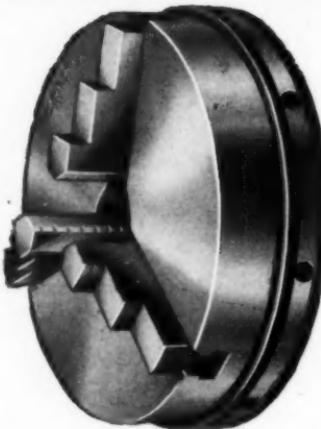
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C-72

## THE LEAVITT MACHINE COMPANY ORANGE, MASSACHUSETTS

### TRAIN "PALACE"

Air conditioning equipment made by the Carrier Corporation of Syracuse, N. Y., will protect the British royal family from Africa's torrid heat during their two-month tour of the Union of South Africa which starts from Cape Town in February, the company announced today. It marks the first visit of the royal family to the Union since George VI became King.

A veritable "palace on wheels," the eight royal coaches now being built at Birmingham, England, in addition to air conditioning, will be equipped with radio,

being air conditioned by Carrier.

Work on the Senate chamber is being engineered by H. G. Skelton & Co., Cape Town Carrier distributor. Equipment consists of two compressors providing 10,000 cubic feet of temperature and humidity-controlled air per minute, a 29R dehumidifier, and a 27C double inlet, double-width fan.

Details of the royal train and South African installations are being handled by Carrier's International Division, N. Y.

Two coaches of the Royal train will be used by Field Marshal Jan Christian Smuts, Prime Minister of the Union of South Africa.

telephones, private baths and all the amenities of home life and stately occasions.

King George VI's coach — "R9" — contains a study, a stateroom and adjoining bath, a workroom for the King's valet, a bedroom for an equerry and one for the King's physician.

The train installation is being made by J. Stone & Co., of London, Carrier's railway representative overseas. Thirteen compressors, using Freon, have already been shipped from Syracuse. The train's air conditioning system will be operated by electric motors.

The pilot train, also of fourteen cars, which will precede the Royal train over all routes, will accommodate government and railway officials and the press.

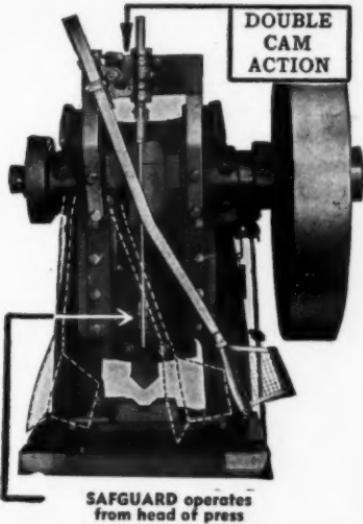
Also for the King's comfort, the Senate chamber of the Parliament Building in Cape Town, where he will address the opening session, is

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## ASTE TO MEET

The 18,000-member American Society of Tool Engineers is one of the first large technical societies to heed Horace Greeley's famous advice "t go West."

The Society's 1947 Annual Convention will be held, March 19-22, at Houston, Texas. Convention Headquarters will be the Rice Hotel, according to a statement from the A. S. T. E. National Office in Detroit.

Harry E. Conrad, Executive Secretary of the engineering group, expects a record attendance of some 2,500 tool engineers

meeting, the current plans reveal.

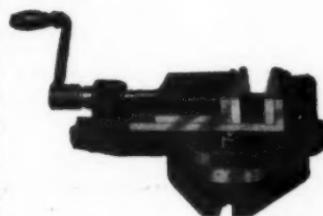
While the accent is on business, and the technical seminars are probably the best ever scheduled for an A. S. T. E. national meeting, the combination of travel, pleasure and business is the drawing card that will lure an unprecedented number of tool engineers.

The Texans, eager to demonstrate the phenomenal industrial growth and vast manufacturing potential of the great Southwest to an important group of technicians and industrialists, have grasped the opportunity to put on a real show.

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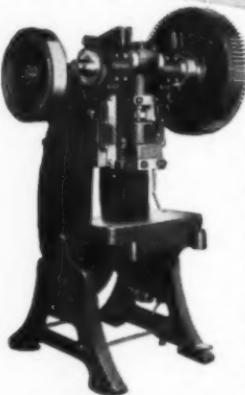
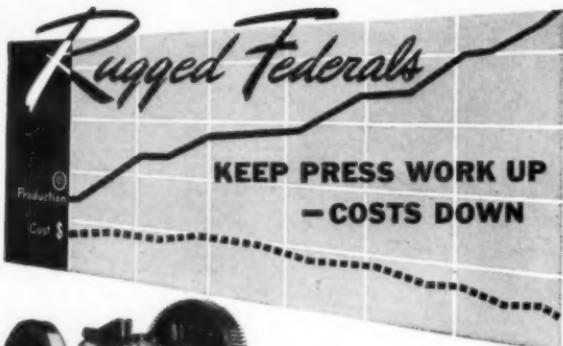
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### BOOK ON TRADE MARK ACT

W. H. Anderson Company, law book publishers of Cincinnati, Ohio, announce the publication this week of the first book on the new trade-mark act—"Trade-Mark Act of 1946", by H. A. Toulmin, Jr., of Dayton, Ohio. (Price delivered single copies \$5.00—10 or more copies \$4.00 each).

This act, known as the Lanham Act, is the first comprehensive law enacted for the protection of trade-marks in the United States. It was advocated for years by the National Association of Manufacturers, Association of National Advertisers, Inc., and the patent committees of

mark becomes contestable and is the property without question of the owner. Heretofore, the registration of a trade mark was only evidence of a claim to the mark. Other important features are used by related companies and the provision for assignment of a mark without sale of an entire business.

New grounds for cancellation are if the mark becomes the common descriptive name of a product or if the mark is being used to violate the anti-trust laws.

The author is a member of the law firm of Toulmin & Toulmin, of Dayton and Washington.

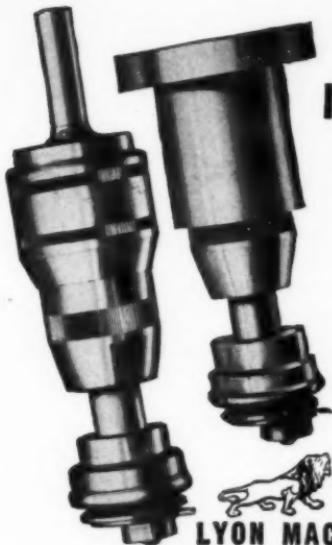
various bar associations.

The author of this book is a well-known authority on trade-mark law and the author of previous trade-mark books and articles, and counsel for a large number of corporations on trade-mark matters.

Under the new law many types of trade marks which could not be successfully protected are now susceptible of protection, such as secondary meaning marks, service marks, certification marks and distinctive package designs.

Another unique feature of the trade mark law is the provision for separate registers. In addition to the principal and supplemental registers, the Commissioner of Patents may establish separate registers for foreign marks, service marks and collective and certification marks.

One of the most vital features of the new trade - mark law is that after a period of years a



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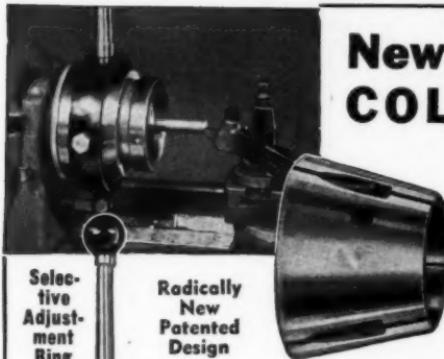
#### SPECIAL HAMMERS

It is interesting to observe different special hand hammers in use in various sections of industry. Safety hammers, for instance, are required for use wherever inflammable gases, explosives or similar hazardous conditions are found. Hammers used in such places must be made of a non-sparking metal. Those who provide safety tools furnish these special non-spark hammers in many different types, including ball pein, cross pein, scaling and sledge hammers. It is well to keep such tools locked up, when they are not in use in any of the hazardous locations for

which they are intended, thus preventing their general use.

Soft hammers are required in many instances, where it is necessary to deliver powerful blows without damage to finished surfaces on machines, tools and products. Striking operations requiring soft hammers include assembling, adjusting, forcing, loosening and dismantling. Soft hammers are often made of lead or babbitt, though other materials are used also. Lead and lead alloy hammers may be obtained from different sources. On the other hand, there are special lead hammer molds available, by means of which any shop having use for very many of these hammers may cast their own. The lead hammer heads are cast directly over pipe, or over special malleable handles, the mold being arranged to clamp to the handle for this purpose.

The soft - face hammer idea has been extended by some, in that hammers have been designed and made in such manner as to clamp interchangeable heads or faces into place, for use on different types of work. Hammers of this head-clamping type may have one head or hammer face of one material, and the other face something different. Those who make such hammers provide heads or faces of copper, babbitt, rawhide and plastic, and one can always use any choice of two of these materials. The plastic faces are the latest development for use with these hammers.



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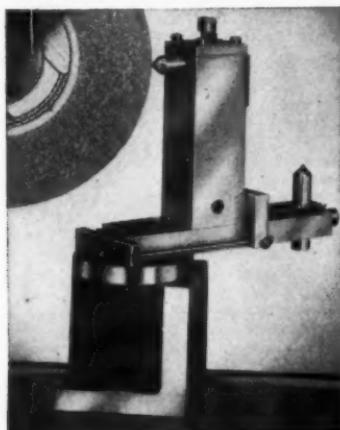
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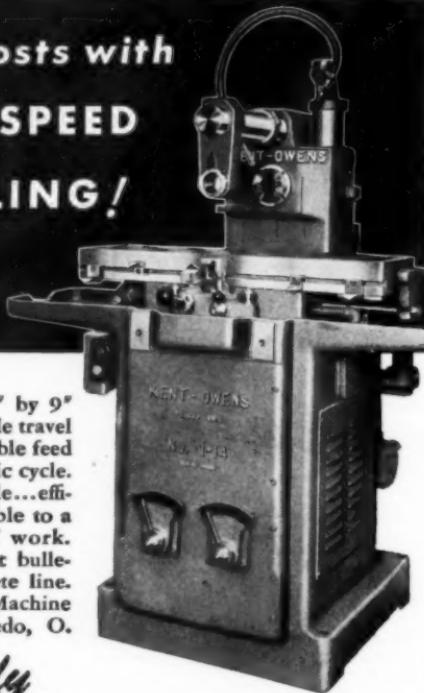
- Large range
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The statement that the mechanical refrigeration and air conditioning industry is three times larger than before the war was borne out this fall in Cleveland when the industry completed the first national display of its products in nearly six years.

Results of the Fourth All-Industry Refrigeration and Air Conditioning Exposition in the Cleveland Public Auditorium Oct. 29 to Nov. 1, tabulated by the Refrigeration Equipment Manufacturers Association, showed that in every respect the event exceeded any previous show of this industry by a wide margin.

The exposition was described by industry leaders as the first real, comprehensive gathering of representatives of every segment of the industry, from service engineers to contractors, from dealers to wholesalers, from individual manufacturers to complete associations, and from designing engineers and suppliers to users who depend on refrigeration, air conditioning and frozen foods for the operation of their businesses.

Attendance at the show was greater than all previous forecasts, being at least triple the attendance at the last all-industry show, held in 1941 before the war halted the industry's expositions. Floor area occupied by 208 exhibitors likewise was three times the 1941 space. In point of equipment shown, size of displays and value of exhibits, the 1946 event likewise far outshone all its predecessors.

Many new types and designs of equipment made initial appearances, while many manufacturers, hampered by material shortages, made preliminary announcements of new products soon to be introduced.

A total of 1,400 pieces of actual equipment were in operation in the Cleveland Auditorium.

Success of the Fourth All-Industry Exposition has spurred plans for the next event to be held in January, 1948.

Preliminary arrangements are being made by the Refrigeration Equipment Manufacturers Association at its Pittsburgh headquarters.

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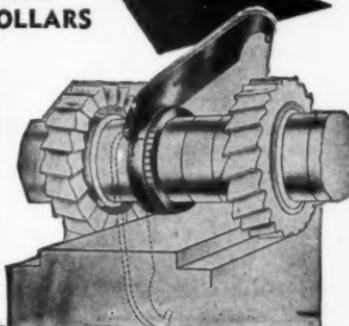
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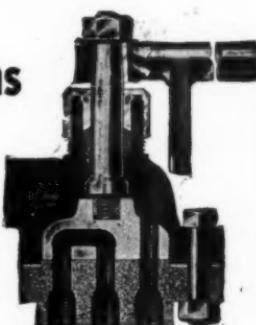
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### SENSE OF IMPORTANCE IS KEY TO WORLD UNITY

Restoration of the individual's sense of personal importance in the world and in business is the gravest problem facing America today. It is the point from which hope of true world unity must spring, Gwylym A. Price, President of the Westinghouse Electric Corporation, declared recently.

Addressing the George Westinghouse Centennial Luncheon sponsored by the Electrical and Gas Association of New York, Mr. Price said that, business management has no greater task today

than to make clear the facts of interdependence and of mutual interest and mutual progress. Understanding and unity, like charity, begin at home. We can not have national unity without unity on a local level. And the place to begin to achieve that unity is in the individual business, in the development of confidence and trust and teamwork between manager and employee.

Surely we can deal effectively with the men and women of our own kind, who speak the same language, have the same birthright and the same basic traditions, and share a common economic interest with us. If we cannot, how can we blame Mr. Molotov for not getting along with Mr. Bevin, or Mr. Byrnes for not winning Mr. Molotov to his way of thinking?

Mr. Price believes that management must spend more time and energy in developing the full potential of individual employees than has been devoted in the past to utilizing technical knowledge and machinery. The human potential can best be developed thru improved appreciation of mutual interest.

Its development requires the elimination of misinformation and misunderstanding, the eradication of conflict and cross-purpose.

The modern industrial structure has robbed many an employee of much of his sense of individual importance. So far as we can, we must restore it.

We must keep our people informed of our plans, our policies, our hopes.

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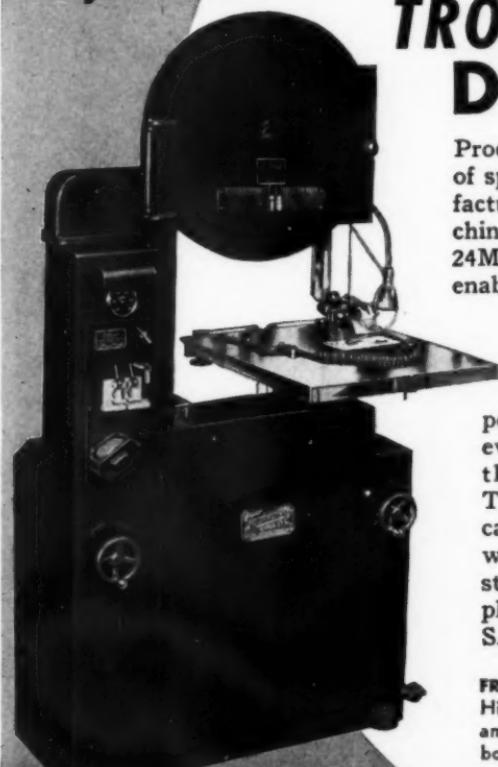
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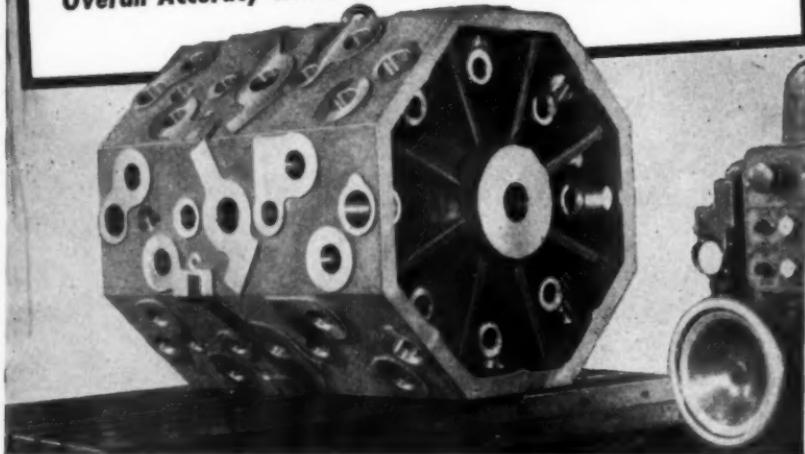
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13/64"	12	9	1.60	13/32"	12	9	2.75
7/32"	12	9	1.60	27/64"	12	9	3.00
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21/32"	15	12	8.00	31/32"	15	12	14.00
11/16"	15	12	8.25	1"	20	15	16.00
23/32"	15	12	8.50	1-1/16"	20	15	17.00
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American Diamond Tool & Gauge Co.	384	Chicago Wheel & Mfg. Co.	194-195
American Emery Wheel Works	21	Chicago Electrical Tool Co.	404
American Measuring Instruments Corp.	272	Cincinnati Grinder Inc.	6-7
American Metal Products Company	340	Cincinnati Tool Co.	256
American Tool Works	353	City Machine Company	259
Ames Co., B. C.	38	Columbus Die, Tool & Machine Co.	324
Anderson Bros. Mfg. Co.	305	Commander Manufacturing Co.	344
Andersons, Inc.	377	Cone Automatic Machine Co.	63
Arguto Oilless Bearing Co.	160	Conner Tool & Cutter Co.	87
Armstrong-Blum Mfg. Co.	Inside Front Cover	Continental Tool Works	
Armstrong Bros. Tool Co.		Div. of Ex-Cell-O Corp.	119
Atlas Pipe Company	108	Conway Clutch Co.	225
Automatic Machine & Tool Co.	355	Cooley Electric Mfg. Corp.	309
Auto Moulding & Mfg. Co.	315	Cook Co., L. A.	230
Avey Drilling Machine Co.	81	Cook Corp.	1-7
		Couter Machine Co., James	124
Baker Bros. Inc.	321	Criterion Machine Works	34
Baldor Elec. Co.	28	Crucible Steel Co. of America	18-19
Barnes Co., W. O.	240	Cullman Wheel Co.	Back Cover
Bath & Co., John	351		
Baumbach Mfg. Co., E. A.	173		
Bay State Abrasive Products Co.	293		
Beaver Gear Works	93		
Benchmaster Mfg. Co.	303		
Benton Co.	303		
Beverly Shear Mfg. Co.	387		
Billings & Spencer	169		
Blake Co., Edward	80		
Black Diamond Saw & Mch. Works	322		
Blank & Buxton Machinery Co.	48		
Bodine Corp.	95		
Boggis & Co., Henry F.	281		
Bolton Tool Co.	149		
Borelli Mfg. Co.	272		
Breuer Electric Mfg. Co.	337		
Brewer Mch. Co., W. F.	188		
Brown Engineering Co.	303		
		Dahlstrom Mfg. Co.	336
		Dake Engine Co.	34
		Dandy Machine Specialties	25
		Davis & Thompson Co.	308
		Dayton Rogers Mfg. Co.	387
		Dearborn, J. W.	227
		Derbyshire Co., F. W.	371
		Desmond-Stephan Mfg. Co.	53
		Detroit Power Screwdriver Co.	367
		Detroit Stamping Co.	50
		De Vlieg Mach. Co.	394
		Dockson Corp.	54
		Dolge Co., C. B.	365
		Dorman Machine Tool Wks.	178
		Dreis & Krumb Mfg. Co.	5
		Dremel Mfg. Co.	29
		Drive-All Mfg. Co.	196
		Dykes Co.	330

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*In Your Own Plant*

## SAVE TIME AND MONEY

With these Versatile Cooley Furnaces

- One model to operate to 2000° F.
- One model, 2 sizes, to heat to 1850° F.
- Use for both hardening and tempering.
- Simple and economical to operate.
- Positive control over high and low heats.
- Uniform temperatures assure results.

### Power Cost Less than 4 Cents per Hour

To hold 1600° F. in the MH-3 furnace requires less than 2 kw. At power rate of 2c per kw.-hr., operating cost is under 4c per hour. Cooley furnaces are easily installed, quiet in operation, and create no fumes or odors.

### Profitable Uses for Cooley Furnaces

1. Hardening, drawing and tempering small batches.
2. Quickly normalizing and annealing small parts.
3. Convenient for high speed pre-heating.
4. Expedites emergency repairs.
5. Predetermining production heat treating technique.
6. Harden and draw in the same furnace with assured temperature control at either heat.



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AND  
DIE SHOPS

### TWO NEW OPTIONAL FEATURES AVAILABLE



1. *Counter Weighted Vertical Lift*  
Door conserves heat where door need not be fully opened. Replaces hinged hearth door at \$20.00 additional on MH-3, MH-4—standard on MH-5.



2. *Heavy Gauge Steel Stand* locates furnace at most convenient operating height and provides additional working and storage space. Add \$35.00 to regular price.

### THREE SIZES—MH-3, MH-4—1850° F. MH-5—2000° F.

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8" W 6" H 14" L	29.6	3400	14.8	\$146.00*
MH-4	10" W 6" H 18" L	.....	4500	19.6	\$222.50*
MH-5	8" W 6" H 14" L	.....	4800	20.9	\$340.00*

\*All furnaces complete with Hearth Plate.

**Automatic Control**—Indicating Controlling Pyrometer—Thermocouple and lead wire—approximately \$150.00.

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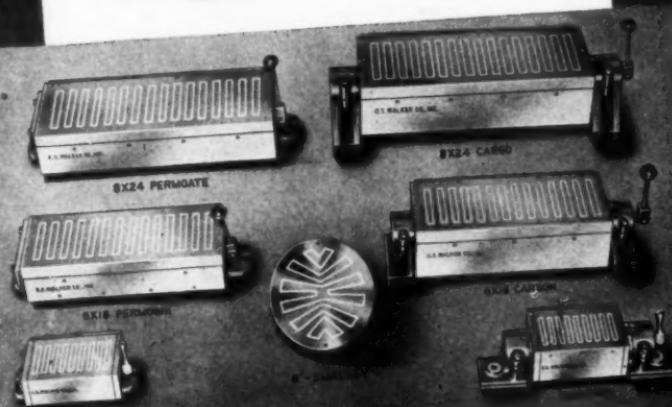
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East Shore Machine Products Co.	95	Janette Mfg. Co.	218
Economy Engineering Co.	14	Jarrett Co. Chas. L.	15
Economy Mch. Products Co.	22	Jefferson Machine Tool Co.	353
Economy Tool & Machine Co.	19	Jessop Steel Co.	231
Erico Products Co.	337	Johnson Gas Wm. C.	210
Eisler Engineering Co.	209	Johnson Gas Appliance Co.	238
Electro-Mechano Co.	290	Johnson Mfg. Co.	126
Elgin Tool Works.	121	Johnson Machine & Press Corp.	329
Elliott Manufacturing Co.	246		
Empire Tool Co.	163		
Enco Manufacturing Co.	116		
Errington Mechanical Laboratory	253		
Esco Engineering Corp.	246		
Fakes & Co., Jos. B.	338	K. O. Products Co.	309
Fairfax Machine Co.	149	Kalamazoo Tank & Silo Co.	47
Federal Foundry Supply Co.	325	Kearney & Trecker Corp.	12-13
Federal Press Co.	382	Kempsmith Machine Co.	91
Fellows Gear Shaper Co.	125	Kennametal, Inc.	83
Fenn Mfg. Co.	170	Kent-Owens Machine Co.	386
Firth-Sterling Steel & Carbide Corp.	33	Keo Cutters	164
Fitchburg Grinding Machine Co.	215	Knight Machinery Co., W. B.	153
Flexrode Company	232	Koebe Diamond Tool Co.	368
Ford Mfg. Co., M. A.	373		
Foster Sales Co.	326		
Fulfillo Specialties Co.	268		
Fulgrip Collet & Tool Co.	334		
Gallmeyer & Livingston Co.	157	L. & J. Press Corp.	343
General Die & Stamping Co.	380	L-W Chuck Co.	44
General Eng. & Mfg. Co.	49	Lassy Tool Company	154
General Manufacturers Supply Co.	338	Leach Machinery Co., H.	393
Giddings & Lewis Machine Tool Co.	103	Leavitt Machine Co.	378
Gilmor Engineering & Mfg. Corp.	331	Leckinger Machine & Experimental Co.	364
Gisholt Machine Co.	11	Lee Co., K. O.	65
Gits Brothers Mfg. Co.	376	Lemco Products, Inc.	56
Glenzer Co., J. C.	30	Lenox Instrument Co.	343
Gorton Machine Co., Geo.	179	Lewthwaite Machine Co., T. H.	308
Govo-Nelson Company	114	Linco Electric Motor Co.	52
Graham Mfg. Co.	244	Lincoln Park Industries, Inc.	285
Grant Mfg. & Machine Co.	7	Lincoln Park Mfg. Co.	288
Great Northern Tool Co.	308	Linley Brothers Co.	388
Greenfield Arbor Press Co.	20	Lipe-Rollway Corp.	Inside Back Cover
Greenlee Bros. & Co.	111	Littell Machine Co., F.	362
Greby Manufacturing Co.	59	Logansport Machine Co.	43
Grob Brothers	347	Lovely Flex. Coupling Co.	176
Grobet File Co. of America	115	Lovely Tool Co.	189
Gruen Gauge Company	287	Lucas & Son, J. L.	274
Hall Mfg. Co.	351	Luma Electric Equipment Co.	234
Hamilton Tool Co.	319	Lyon Machine Co.	383
Hammond Machinery Builders.	79		
Hanning Brothers, Inc.	3		
Hart Machine Co.	325		
Hartford Special Machine Company	102		
Harvey Mfg. Corp.	297		
Haskins Co., R. G.	175		
Heim Co.	75		
Heimann Mfg. Co.	339		
Hendey Machine Co.	201		
Herkimer Tool & Model Works.	335		
Heuer Mfg. Co.	362		
Heavy-Duty Electric Co.	211		
Highland Engineering Co.	271		
Hiley Wolf Machine Co.	223		
Hobart Brothers Co.			
Hoburg Gage Co.	106		
Hovis Screwlock Co.	324		
Howe & Son, Inc.	351		
Hydro-Borer Co.	295		
Ideal Tool & Die Co.	316	National Acme Co.	99
Independent Pneumatic Tool Co.	105	New Albany Machine Mfg. Co.	312
Industrial Products Suppliers.	306	New Britain Machine Co.	27
Ingersoll Milling Machine Co.	37	New Britain Gridley Machine Co.	107
		New Britain Tool & Mfg. Co.	357
		New Method Steel Stamps, Inc.	343
		New Milford Carbide Tool Co.	359
		New Wrinkle Inc.	193

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Nichols Mfg. Corp.	221	Simonski, Gilbert S.	122
Nicholson & Co., W. H.	588	Skilsaw, Inc.	22-23
Nicholson File Co.	150-155	Skinner Chuck Co.	42
Nielsen, Inc.	362	Slater Co., Paul B.	346
Nielsen Tool & Die Co.	214	Smit & Sons, J. K.	165
Norgren Co., G. A.	61	South Bend Lathe Works	130
North West Tool & Machine Works	156	Specialty Equipment & Machinery Corp.	345
Numberal Stamp & Tool Co.	264	Speed-Driven Inc.	191
		Spiral Mfg. Corp.	379
		Standard Electrical Tool Co.	70
		Standard Pressed Steel Co.	120
		Standard Transmission Equipment Co.	192
		Stearrett Co., L. S.	175
		Stockwell Corp.	98
		Stow Mfg. Co.	292
		Strand & Company, N. A.	375
		Strand Manufacturing Co.	379
		Sturtevant Co., P. A.	113
		Sun Oil Co.	147
		Sundstrand Machine Tool Co.	219
		Sunnen Products Co.	78
		Syntron Company	289
Oliver Instrument Co.	31		
O'Neil-Irwin Manufacturing Co.	74		
Paddock Tool Co.	252	Tannenwitz Works	391
Plunket Machine Co., J. E.	214	Tatco Tool Co.	178
Pneumatics, Inc.	286	Taylor, Fenn Company	72-235
Pope Machinery Corp.		Taylor Mch. Co.	338
Porst Bros. Mfg. Co.	73	Templeton, Kenly & Co.	198
Porter-Cable Machine Co.	385	Thermo Electric Mfg. Co.	60
Portland Forge & Foundry Co.	128	Thomas Hoist Co.	311
Portman Machine Tool Co.	243	Thomas Machine Mfg. Co.	213
Potter & Johnston Mch. Co.	224	Threadwell Tap & Die Co.	161
Pratt & Whitney	127	Torit Manufacturing Co.	24
Precision Products Co.	185	Trico Fuse Co.	315
Premier Safety Chuck Co.	374	Trindl Products, Ltd.	403
Production Machine Co.	171	Trow, Robt. A.	266
Producto Machine Co.	320	Troyke Mfg. Co.	230
Putnam Tool Co.	92		
Pyrometer Instrument Co.	177		
Quality Tool Works	357		
R & L Tools.	255	U. S. Hoffman Mch. Corp.	88
Racing Tool & Machine Co.	118	United Precision Products Co.	36
Reading Machine Co.	318		
Reich Mfg. Co., J. R.	346		
Rivett Lathe & Grinder, Inc.	2		
Robbins Eng. Co.	10	Vanderwall Co., E. H.	346
Robertson Mfg. Co.	40-41	Van Keuren Co.	101
Rockford Clutch Div.	297	Vascoley-Ranmet Corp.	71
Rockford Machine Tool Co.	96	Victor Machinery Exchange	395-396-397
Rotor Tool Co.	45	Victor Saw Works	377
Rouse & Co., H. B.	360	Vimco Mfg. Co.	258
Royal Oak Tool & Machine Co.	110	Vonnegut Moulder Corp.	293
Rusnak Tool Works	358		
Ruthmar Machine Co.	16		
Ruttard Tool Service	343		
Ryerson & Son, Inc., Jas. T.	134		
S & E Machine Products	205	Wade Instrument Co.	315
S & S Machine Works	357	Waldes Kohinoor, Inc.	55
Sales Service Machine Tool Co.	187	Walker, G. O. S.	41
San Angelo Foundry & Machine Co.	322	Walker-Turner Co.	233
Schaffner Manufacturing Co.	205	Walls Sales Corporation	340
Schauer Machine Co.	62	Walton Co.	188-330
Sehmarie Tool & Engineering Co.	355	Wardwell Mfg. Co.	248
Schmidt Inc., Geo. T.	381	Wells Mfg. Corp.	9
Schultz & Anderson Co.	338	White Dental Mfg. Co., S. S.	159
Screw Machine Specialty Co.	355	Whitney Metal Tool Co.	341
Scully-Jones & Co.	32	Wiley's Carbide Tool Co.	983
Seneca Falls Machine Co.	199	Wilson, K. R.	57
Service Machine Co.	109	Wittke Mfg. Co.	273
Severance Tool Industries	295	Wolco Tool Division	314
Sheldon Machine Co.	279	Woodworth Co., N. A.	97-301
Short & Assoc., J. M.	333	Wyzensbeck & Staff, Inc.	181
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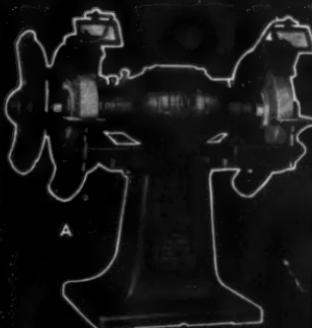
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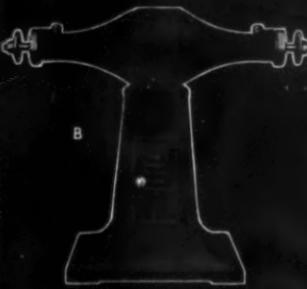
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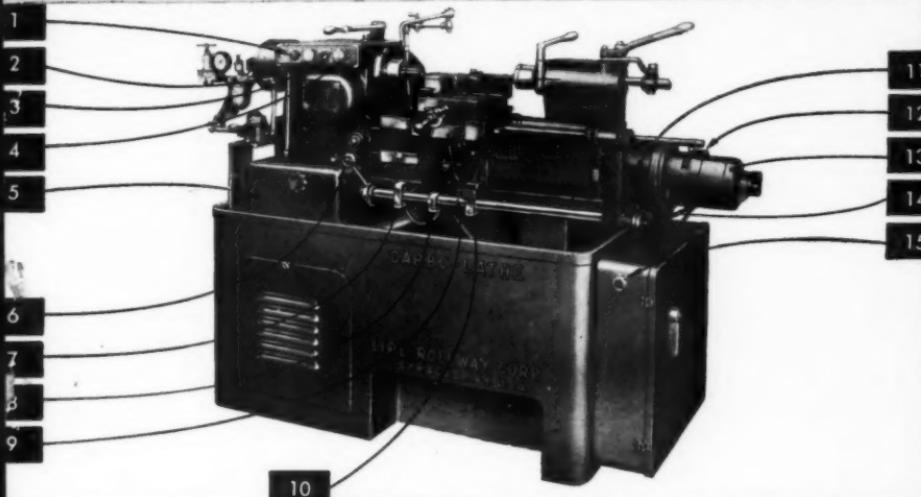
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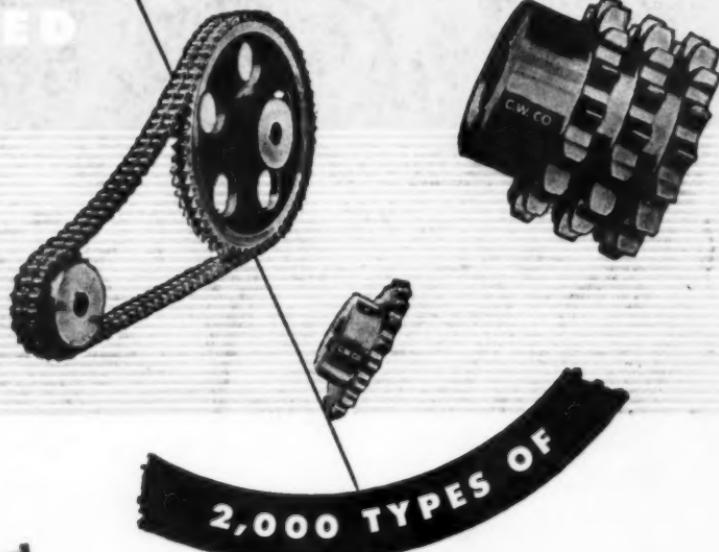
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